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THE IRON AGE PUBLISHING COMPANY

F. J. FRANK, President G. H. GRIFFITHS, Secretary C. S. BAUR, General Advertising Manager

PUBLICATION OFFICE: N. W. Corner Chestnut and 56th Sts., Philadelphia, Pa.

EXECUTIVE OFFICES: 239 West 39th St., New York, N. Y., U. S. A.

Member, Audit Bureau of Circulations
Member, Associated Business Papers

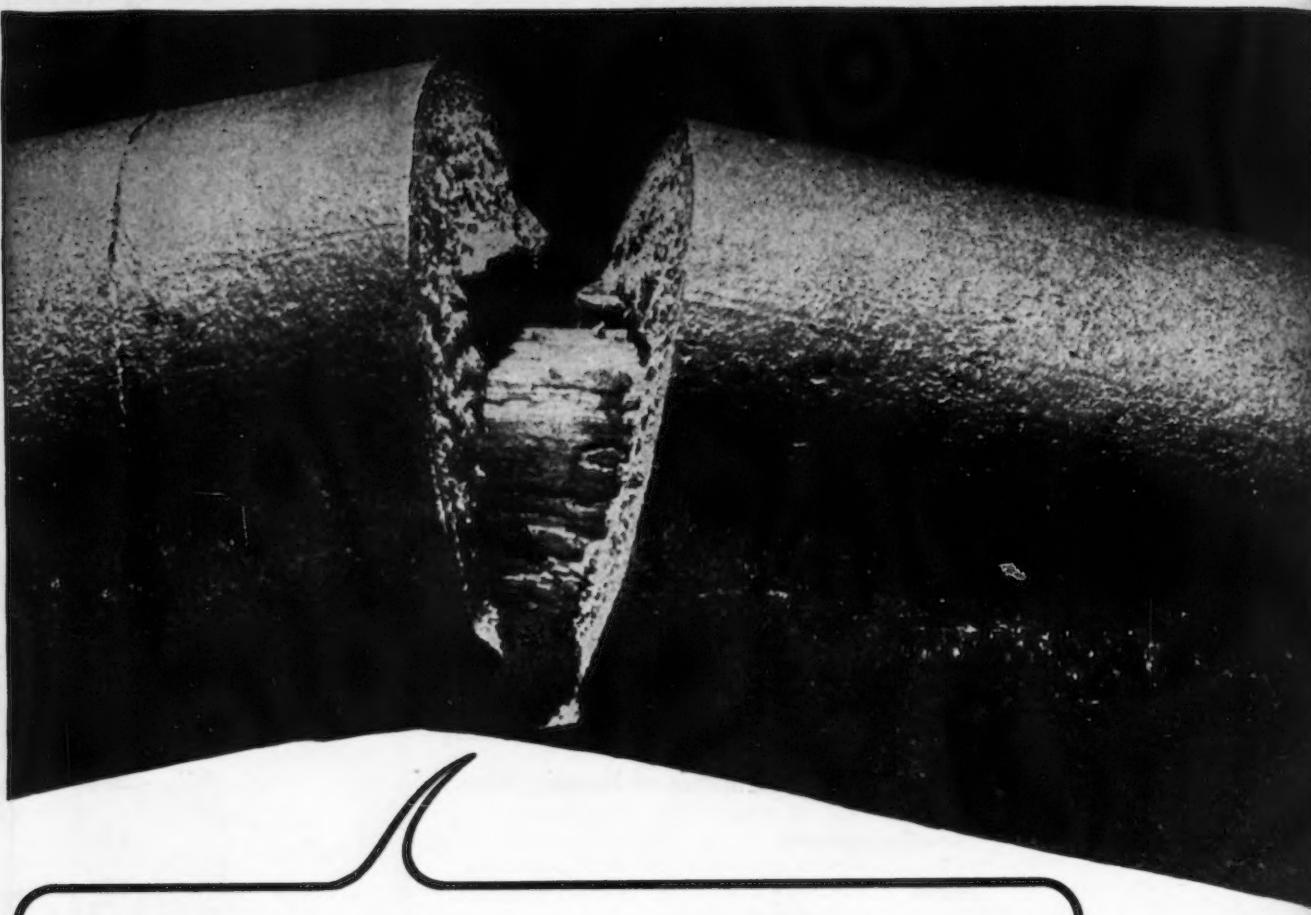
Published every Thursday. Subscription Price:
United States and Possessions, Mexico, Cuba,
\$6.00; Canada, \$8.50, including duty; Foreign
\$12.00 a year. Single Copy 25 Cents

Cable Address, "Ironage, N. Y."

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ESTABLISHED 1855

AUGUST 23, 1934

Vol. 134, No. 8

Detroit Labor Revolts Against "Carpet Baggers"

CASE

T is a matter of history that the ink was not yet dry on the President's signature to the National Industrial Recovery Act before the American Federation of Labor set out on its unionization campaign. It immediately invaded communities such as Pittsburgh and Detroit which had lived for years in an atmosphere of industrial peace, saying to the workers in the steel plants and the automobile factories that the federal government, through Section 7a of the Recovery Act, was desirous of having all of labor organized.

"Carpet baggers" was the name which Detroit applied to these invaders. And carpet baggers they were, for William Collins, A. F. of L. leader in the motor car industry, and his lieutenants, had no real interest in Detroit except as it might enhance their personal fortunes. They came to southern Michigan overnight, established headquarters and started to function as champions of the workingman.

These men, through their oratory and personal solicitation, brought thousands of workers into the Federation fold. The country had just gone through perhaps the most critical days in its history. All things temporarily had lost their values. Wages necessarily had sunk distressingly low. Millions couldn't get work of any kind. The nation's banks had failed by the hundreds. Men seeing everything being stripped from them were bitter and became easy prey to emotional appeals.

THE play upon deep passions enabled these skilled union organizers to have their inning. But in every situation the time finally arrives when sound reasoning reasserts itself and the senses give way to the logic of the mind. If one may judge rightly of what is occurring in the ranks of the A. F. of L. at Detroit, that time has arrived for automobile workers.

It has remained for union men prominent in the United Automobile Workers Federal Union, automotive affiliate of the A. F. of L., to discover what to outsiders has been apparent from the beginning. Arthur Greer, who has led the Hudson Motor local union out of the Federation, is quoted as saying that Hudson work-

ers objected to the excessively high dues which they were forced to pay to the Federation and to the fact that thirty-five cents out of every dollar of dues went to the national organization and was spent in whatever way the national officers pleased.

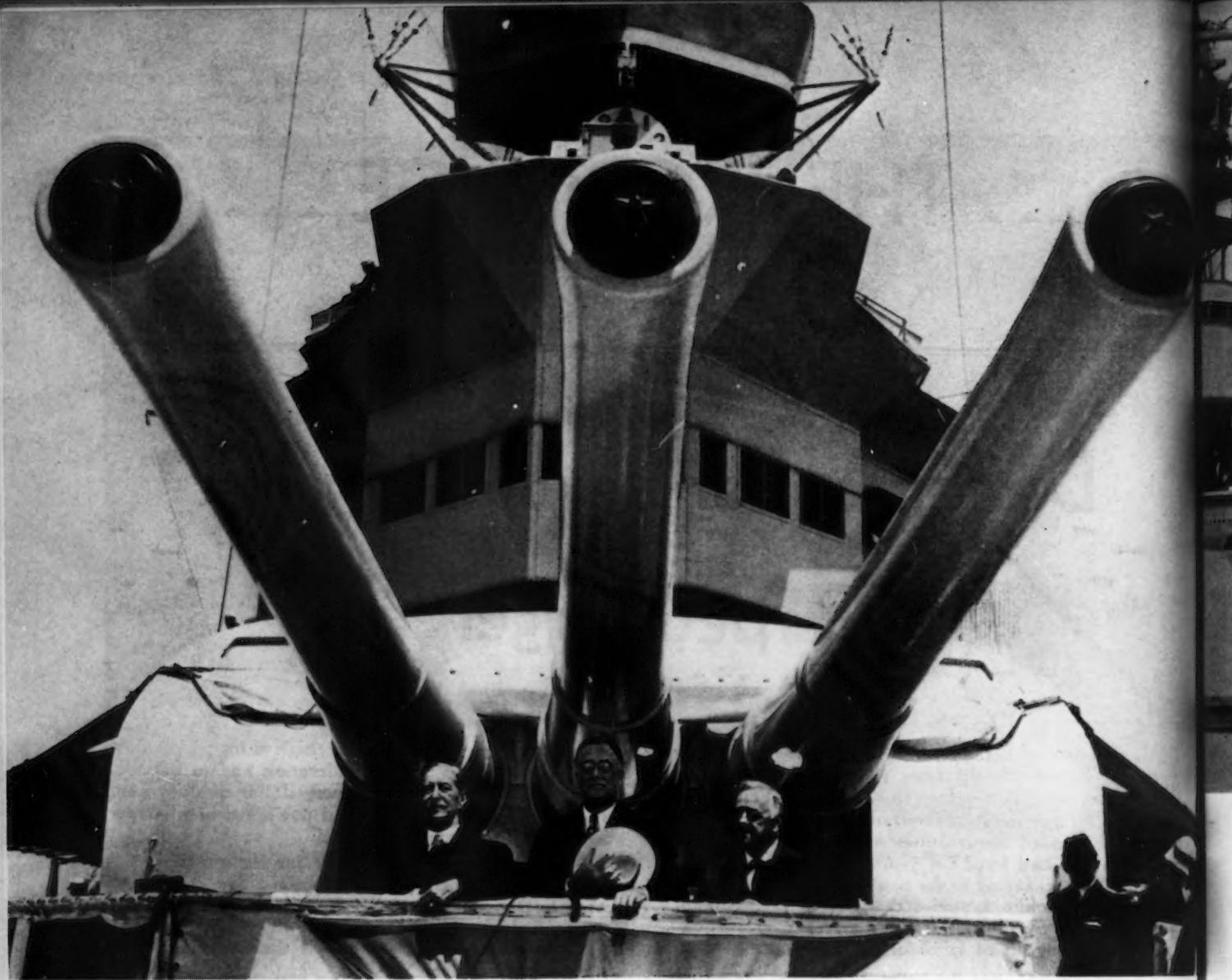
Over the protests of Mr. Greer and his associates the A. F. of L. recently formed an executive council to direct the policies of the federal automobile local unions. This council is permitted to discuss only matters brought before it by the chairman, who is the personal representative of President William Green. Says Mr. Greer, "This council is controlled by a Federation clique that has grown more autocratic than democratic."

The executive council asked President Roosevelt recently to remove Richard Byrd, labor representative on the Automobile Labor Board. Mr. Greer and his followers think Mr. Byrd has been doing a good job. It appears that Mr. Byrd has the foolish notion that labor and management should and can work together amicably and is governing his actions with that end in view. This notion, of course, hardly affords comfort to an organization which thrives most when it is stirring class against class.

IN no uncertain language Mr. Greer states the fundamental issue at stake. He is reported to have said, "We want to do the fair thing by the Hudson management, and we know they want to be fair to us. But we feel that the company does not want to deal with persons not connected with the business and we don't blame them. We want to elect our own representatives from among our men and delegate them to bargain with our employers. Outsiders, no matter how deeply they have their interests at heart, cannot deal as effectively with our employers as we ourselves can."

From the lips of a union worker comes the above acknowledgment of the rightness of a principle for which management has contended since the troublesome Section 7a came into being.

BURNHAM FINNEY
Detroit Editor, THE IRON AGE



Special Equipment Employed in

By M. M. McCALL

To machine efficiently guns of large caliber heavy machine tool equipment of special design is required.

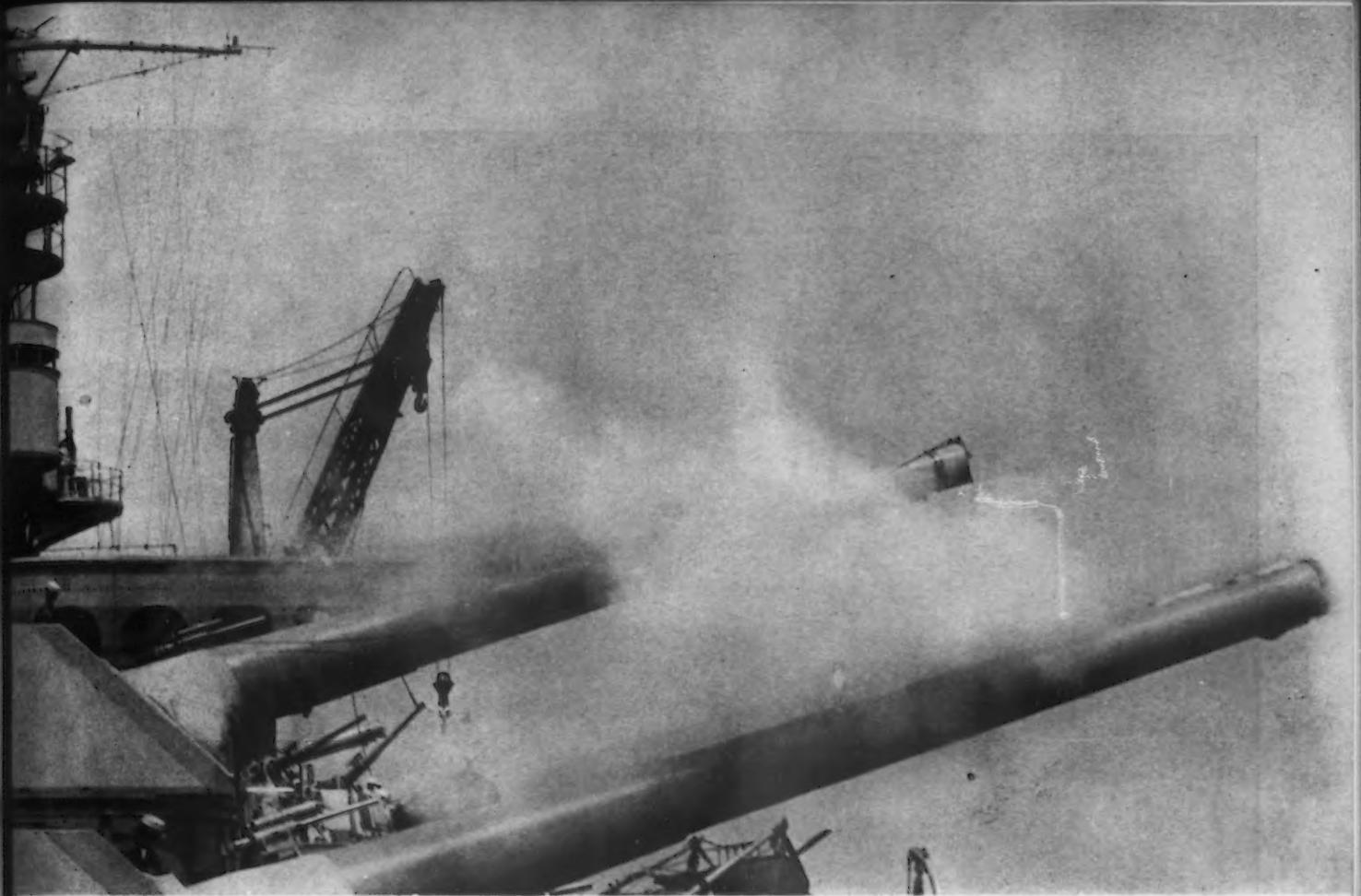
These guns are of built-up type, and are constructed by shrinking several concentric layers of hoops over a central inner tube. The tube extends the entire length of the gun and contains the bore and the powder chamber. The long hoop that is shrunk over the breech end of the tube and extends well forward toward

the muzzle is called the jacket. Hoops of shorter length are shrunk over the jacket, and other hoops over these jacket hoops, the number of layers increasing toward the breech end of the gun.

Built-up guns are constructed on the principle of "initial tensions." The initial tension and compression set up in the different parts by shrinkage causes them to work together to resist the pressure from the explosion, as many of these initial forces must be entirely overcome before any stress resulting from the explosion is produced in the parts of the gun.

The different parts of the gun are forged from large ingots. forgings

NEWSPAPER comment during the recent visit of the combined fleets of the United States Navy to New York and other ports emphasized the impressiveness of the large guns and other equipment of modern naval vessels. Quite as impressive, though unsung in newspaper columns, is the mammoth machinery employed in building these gigantic weapons of defense. One of the lathes described in this article, for example, handles guns having an outside diameter of 84 in. and a length of 87 ft. The machine is 212 ft. long



MANY large-scale and precise manufacturing operations—in steel mill and machine shop—lie behind these awe-inspiring weapons of defense. Beneath those in the view on opposite page stand President Franklin D. Roosevelt, Secretary of the Navy Claude Swanson, and former Secretary of the Navy Josephus Daniels. The occasion was the recent review of the combined United States fleets. The ship is the U.S.S. Indianapolis. (Wide World Photos.)

in Machining Large Caliber Guns

and weighs more than 420 tons; its face-plate alone, which is driven by a 100-hp. motor, weighed 15 tons in the rough. In addition to machine tools for roughing and finishing the gun tubes, jackets and hoops of large guns, Mr. McCall describes equipment employed for the important operation of rifling. Machining of armor plate, a closely related subject, was described by the same author, who has been identified with both the design and manufacture of such equipment, in our issue of June 7, page 23.

for the tubes are solid, but when the size of the hole is large enough, the jackets and hoops are hollow forged.

The special machine tool equipment is required for the rough and finish turning and boring of the tubes, jackets and hoops, and also for rifling the finished bore.

The machine in the right foreground of Fig. I is a Bement 70-in. heavy roughing lathe for rough turning operations on large caliber gun tubes. It is driven by a 75-hp. motor and has four carriages, two on the front shears of the bed and two on the rear. Each carriage has independent feed from the headstock by means of a spline shaft, change gears

on the carriage and a rotating nut on a fixed leadscrew. Independent rapid power traverse is provided by a 5-hp. motor on each carriage. This lathe has a maximum length of 77 ft. 6 in. between centers and swings 53 in. over the carriages.

In the background of Fig. I may be seen a Bement center-driven double-end boring machine employed for rough boring large caliber gun tubes from the solid. The forging is clamped in a center driving head which is rotated by a 75-hp. motor. The ends of the forgings are supported in rotating steadyrests which are adjustable along the bed to suit the length of the forging. The ma-

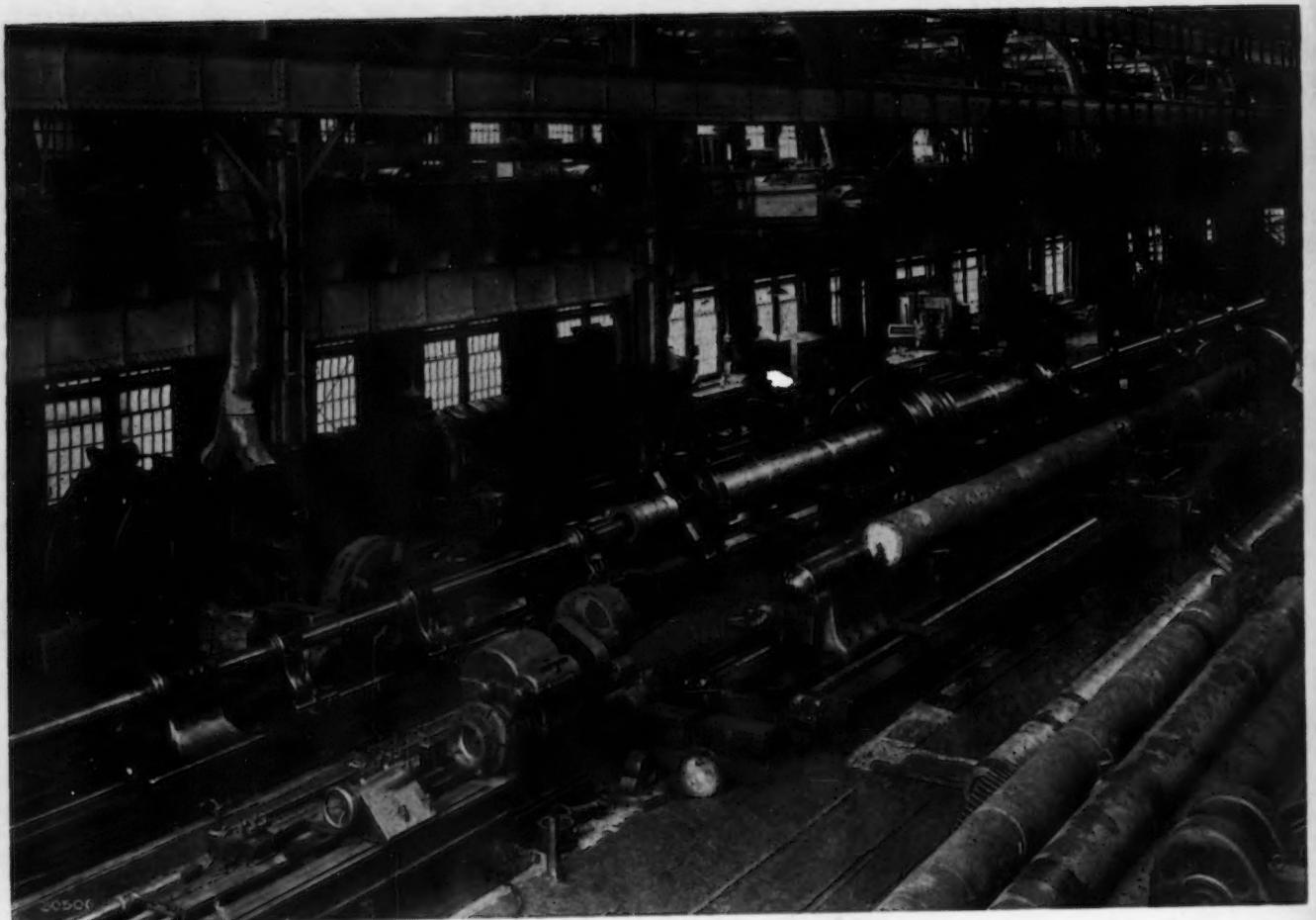


Fig. 1—Forgings for gun tubes are rough turned and bored on machines of this type. ▲▲▲

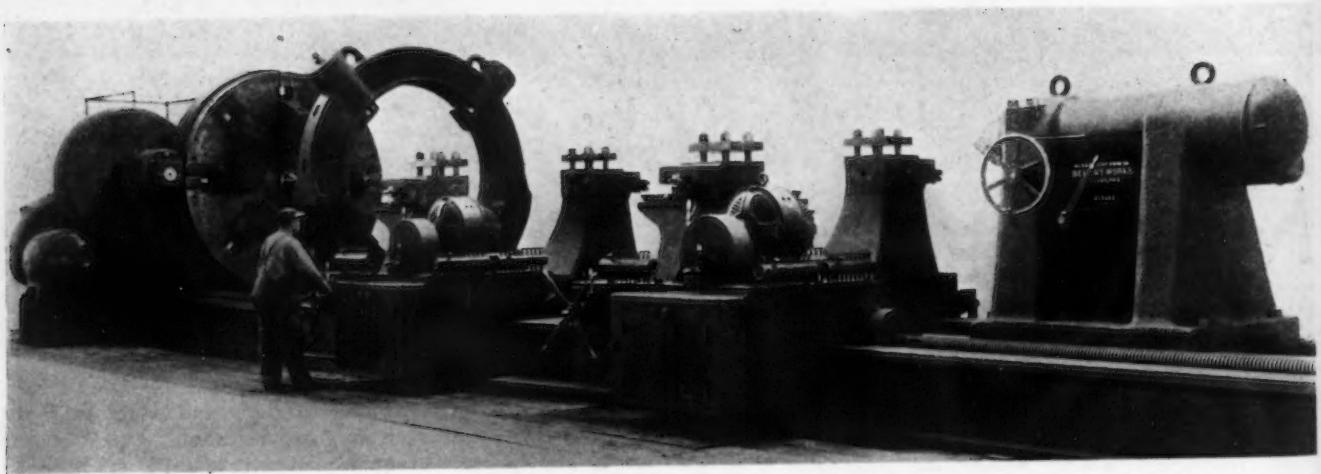


Fig. 2—Hoop and jacket forgings are rough turned on 120-in. extra-heavy turning lathe. ▲▲▲

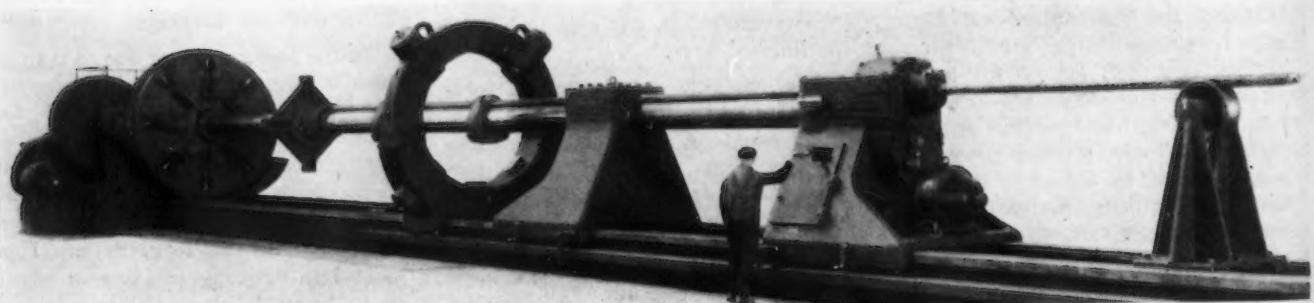


Fig. 3—Hollow forgings for hoops and jackets are rough bored on this special boring machine. ▲▲▲

chine is equipped with two 12-in. non-rotating boring bars to bore simultaneously from each end of the forging. Each bar will bore a distance of $37\frac{1}{2}$ ft. in a forging 75 ft. long. In addition, one of the bars is of sufficient length to bore a 75-ft. hole from one end. The boring bars are held in supports along the bed. They are clamped in the rear supports to prevent their rotation, and also to provide feed and traverse when the support is moved by means of a nut on a screw in the bed. Each screw is driven by a 20-hp. feed and traverse motor. The opening in the center driving head is 42 in. in diameter, and the overall length of the machine is 204 ft. 9 in.

Machining Jacket and Hoop forgings

Fig. 2 shows a Bement 120-in. extra-heavy rough turning lathe for jacket and hoop forgings. It has two carriages with front and back rests, and is driven by a 100-hp. motor. The maximum distance between centers is 50 ft. and the swing over the carriages is 84 in. The carriages are independent of the faceplate, each being fed or traversed by a 15-hp. motor mounted on the carriage, which turns a rotating nut on a fixed leadscrew.

In Fig. 3 is shown a Bement 120-in. hollow-forging rough boring machine for boring large hoops with internal diameters up to 80 in., and jackets and hoops up to 44 ft. in length which are hollow forged with holes not less than 30 in. in diameter. The forgings are held in the faceplate jaws and in the steadyrest, the faceplate being driven by a 50-hp. motor. Boring heads with different capacities are mounted on a 15-in. non-rotating bar which is supported in the spindle and at the rear by two sliding heads. The front head supports and clamps the bar, while the rear head carries the mechanism for feeding and traversing the boring head along the bar. Driven by a 20-hp. motor, this mechanism turns a rotating nut on a fixed screw. The front end of the screw is fastened to the boring head and moves it along the bar as the screw moves through the rotating nut. Roller supports are provided for the overhung portion of the feed screw when the boring head is moved to the rear. The sliding heads are traversed along the bed by a 30-hp. motor, each head being provided with a split nut to engage a screw in the bed.

Close-Limit Machining Required Before Assembling

The three Bement 102-in. lathes pictured in Fig. 4 are for finish turning and boring of guns and their

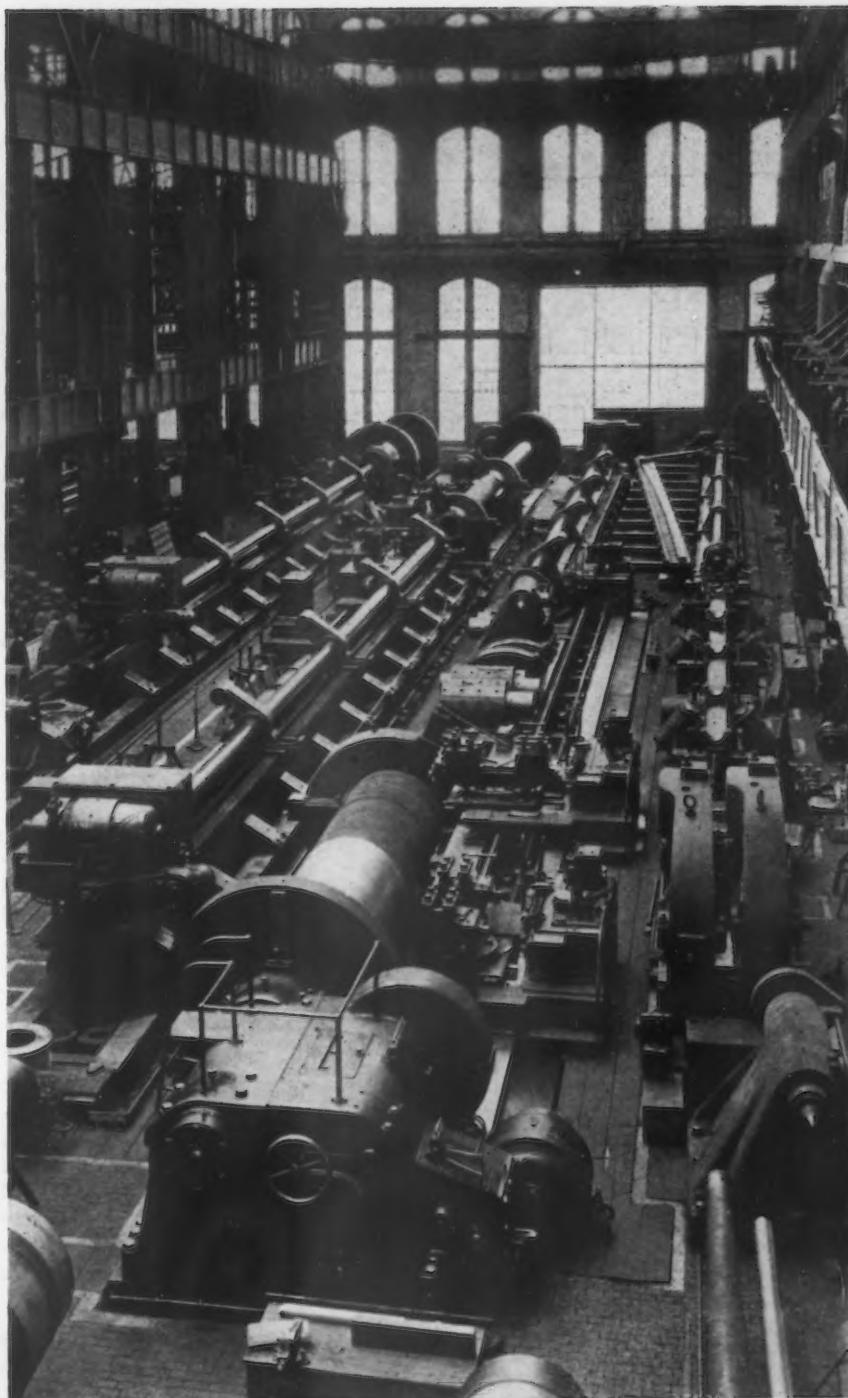


FIG. 4—Finish turning and boring operations on guns and their component parts are done on these three 102-in. finishing lathes. This view also shows the rifling machine.

component parts before and after each shrinkage operation. These machines must be capable of very accurate work as the parts are finished to close limits before assembling. They have capacity for machining guns with a bore of 16 in. and a length of 73 ft. 4 in. (55 calibers).

The faceplate of these lathes is driven by a 75-hp. motor. The two carriages, which are identical, slide on the front two shears of the bed. Carriage feed gears are driven by a long square shaft which transmits

the feed from the headstock. Longitudinal feed along the bed is obtained by a rotating nut on a fixed lead-screw parallel to the square feed shaft. Transverse feed to the cross-slide and feed to the tool-holders for any angular position of the tool-slide are also provided. Swing arms and change gears are furnished for cutting a large number of tapers. Longitudinal and transverse feeds are used simultaneously to obtain the tapers. Change gears are also provided for thread chasing. Rapid

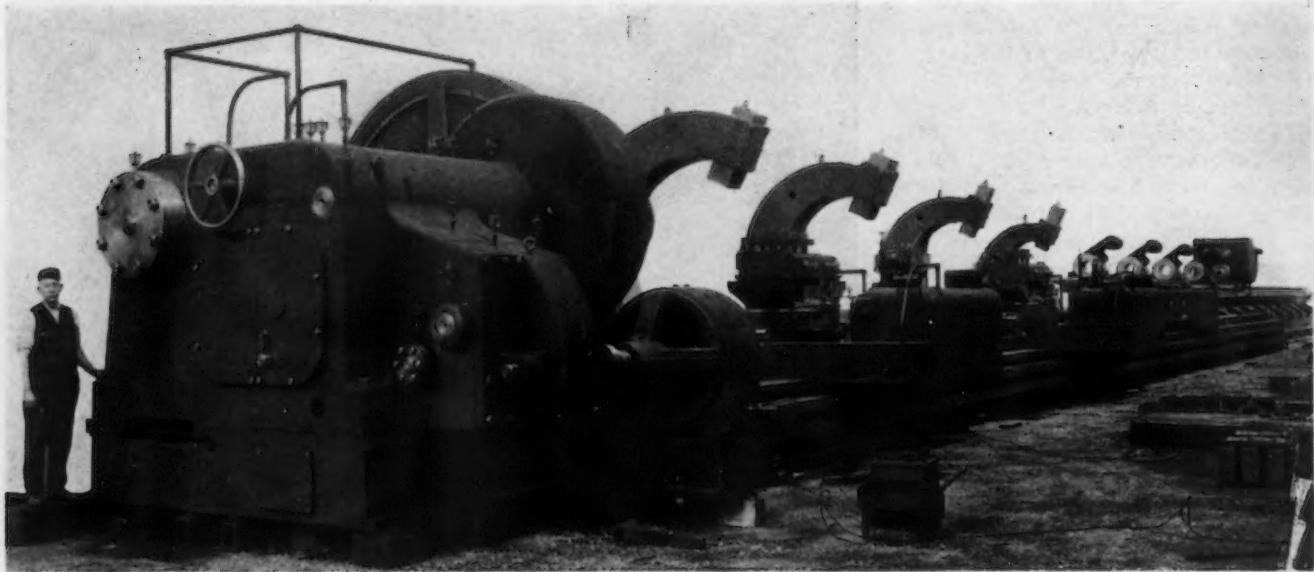


FIG. 5—This 120-in. finish turning and boring lathe has capacity for 20-in. guns. It has an overall length of 212 ft. The faceplate alone weighed 15 tons in the rough. ▲▲▲

power traverse for all carriage movements is obtained from a 15-hp. motor, mounted on the carriage which is interlocking with and operates through the feed mechanism. The tailstock is removed during boring operations. Steadyrests are used to support the work.

A boring bench is mounted on the two rear bed shears. A feed and traverse box is attached to the forward of this bench and extends over the front bed shear. Boring bar feeds are obtained from the square feed shaft and suitable feed change gears in the box which turn a screw in the top of the boring bench. A nut on the boring-bar drive box at the rear gives the necessary motion to the boring bar. The front boring bar support is stationary on the bench while the others move at varying

speeds and maintain support for the bar at equal distances.

Boring Bar Has Power Traverse

Rapid power traverse for the boring bar is provided by a 20-hp. motor mounted on the boring-bench feed box, which is interlocking with and operates through the feed mechanism. This motor also turns a rotating nut on the fixed leadscrew and thereby provides rapid movement of the entire boring bench along the bed.

A 25-hp. motor, mounted on the boring-bar drive box, drives the spindle in the box which is in line with the boring bar. Clutch teeth are cut in this spindle for attaching and driving the boring bars. Several sets of bushings for the boring bar supports are provided for boring bars of

different diameter. The boring bar supports have angular caps which are hinged and counterweighted. When the gun bore is to be calipered with a star gage, the boring bar is traversed from the gun, the caps are opened, and after the bar is unfastened from its driving spindle, it is rolled out of the way on the flanges of the bushings which roll in tracks on the supports.

The star gage is a long, hollow brass tube with a head on the forward end having three radial points of tempered steel which can be moved in and out by longitudinal movement of a rod in the tube. Movement of the radial points is actuated by a wedge on the rod, and the longitudinal movement of the rod swings a pointer at the rear of the brass tube which indicates the diameter.



Fig. 6—Rifling bar about to enter a 14-in.—45-caliber, lined gun. ▲▲▲

The boring bar may be clamped so that it does not rotate during the boring operation; or it may be rotated to obtain a proper relative speed for boring at the same time the spindle is being rotated at a speed suitable for turning operations.

Lathe With Capacity for Guns Having 20-In. Bore

After the gun has been completely assembled, it is placed in a lathe of this type and finish bored and chambered. A bushing, sometimes made of hard wood, turned to the diameter of the finished bore is mounted on the tool-holder directly behind the boring tools and forms a moving support for the front end of the boring bar.

A Bement lathe of the same general design, but larger, is shown in Fig. 5. This lathe will machine a gun with a bore of 20 in., an outside diameter of 84 in. and a length of 87 ft. It has a swing of 120 in. over the bed, an overall length of 212 ft. and weighs 842,000 lb. The bed is 205 ft. 6 in. long and is made in seven sections, four of which are 9 ft. 10 in. wide with three shears, and the remaining three are 5 ft. 10 in. wide with two shears. Fig. 5 does not show the entire length of the machine as the rear bed section had been removed to clear a railroad track in the erecting shop.

The fixed leadscrew on the bed is 6 in. in diameter, 1-in. pitch, 3-in. lead. It is 114 ft. in length and is made in two sections and bolted together. The boring bench is 101 ft. long and was cast in three sections. The boring bar is not shown in this illustration.

Each carriage weighs 25 tons, complete, and the rough steel casting for the faceplate weighed 15 tons. The faceplate is rotated by a 100-hp. motor.

When the assembled gun has been finish bored, it is set up on the bed of a rifling machine with the muzzle toward the rifling bar. Rifling is a system of spiral grooves cut into the surface of the finished bore of the gun, the purpose of which is to impart a spinning motion to the projectile and prevent its tumbling end over end.

Equipment for Rifling

As shown in Fig. 6, the cutter head with the grooving tools is mounted in the front end of the rifling bar, and provides a moving support for the bar in the bore of the gun. These cutter heads are made with provision for collapsing the tools after the cutting stroke to clear the work during

the return stroke. They also have micrometer adjustment for setting the tools to the depth of the grooves.

As the rifling bar is moved through the bore it is also rotated the proper amount so that the combined motions of translation and rotation will give

former bench with the former bar in place. The cutter head and rifling bar are driven through the gun by a 35-hp. motor which rotates a screw extending the length of the bar bed. The bar is moved by its rear support to which a nut is attached. The front

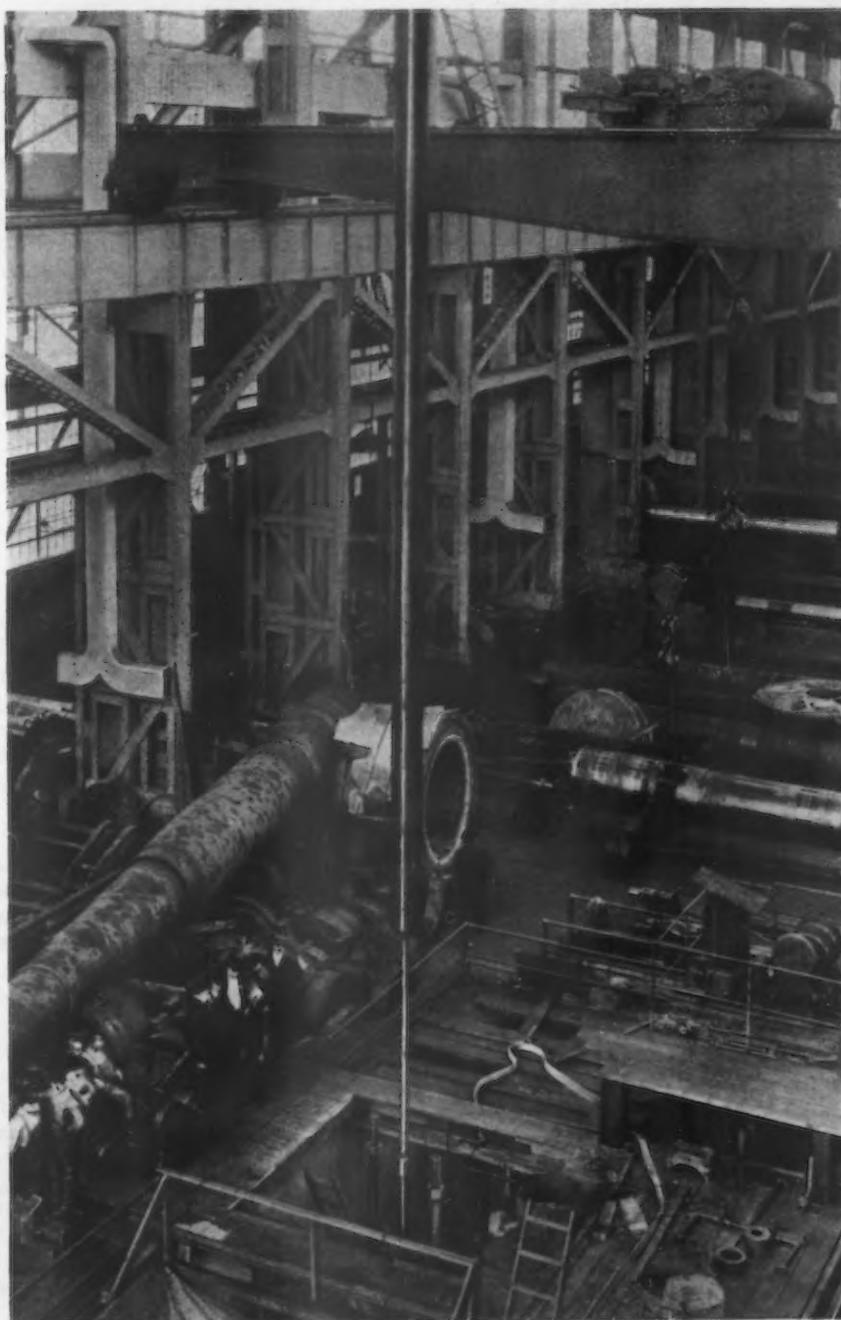


Fig. 7—Liner positioned for assembly over the shrinkage pits. ▲▲▲

the required twist to the grooves. In some guns the rifling has a constant pitch or uniform twist, while in others it has a gradually increasing twist as the muzzle is approached.

In the upper right-hand part of Fig. 4 may be seen a Bement rifling machine for guns up to 16-in. bore. The rifling bar is in position on the bar bed, to the left of which is the

support is stationary and the intermediate supports are moved at varying speeds to maintain supports for the bar at equal distances as it moves forward.

A long arm extends from the rear support over the former bench, serving as a housing for a sliding rack. The former bar is set to an
(Concluded on Page 68)

USING material taken from finished oil-still tubes rather than material from bar stock of similar composition, Howard C. Cross, metallurgist, Battelle Memorial Institute, Columbus, Ohio, and E. R. Johnson, assistant chief metallurgical engineer, Republic Steel Corp., Massillon, Ohio, recently made an extended investigation of creep properties. They contributed the results of their tests to the American Society for Testing Materials, and their paper in large part was as follows:

Tubes Made from Two Heats of Steel

The steels used were of the 4 to 6 per cent chromium, 0.50 per cent molybdenum type and of two different carbon contents. The analyses of the other alloying elements were duplicated as closely as possible.

Two heats were melted in the plant of the Republic Steel Corp., using a 6-ton electric furnace and normal melting practice. The melts were cast in 20-in. round Gathmann type ingot molds. The ingots weighed approximately 4750 lb. each.

The ingots were rolled into blooms and then to 5½-in. rounds. The bars were sent to a tube manufacturer and fabricated into still tubes 5 in. O.D. and ½ in. wall thickness. In normal practice the tube manufacturer anneals the still tubes, but in this case the tubes were returned to Republic without annealing to permit variations in heat treatment.

Numerous chemical analyses of the two materials gave the results here tabulated.

COMPOSITION OF THE STILL TUBE MATERIAL

	Steel No. I	Steel No. II
Carbon, per cent.....	0.139	0.181
Manganese, per cent..	0.38	0.40
Sulphur, per cent.....	0.015	0.014
Phosphorus, per cent..	0.017	0.015
Silicon, per cent.....	0.35	0.35
Nickel, per cent.....	0.23	0.26
Chromium, per cent....	4.63	4.96
Molybdenum, per cent.	0.54	0.49

Blanks for preparation of longitudinal and transverse test specimens were cut from the finished tubes. To

Creep Properties of Oil-

USERS of oil still tubes, of the 5 per cent chromium and ½ per cent molybdenum class of steel, and for that matter the whole of the growing numbers of steel buyers interested in the behavior of steels at elevated temperatures, were given quantitative information at the meeting of the American Society for Testing Materials by Metallurgist Cross, of the Battelle Memorial Institute, and Metallurgical Engineer Johnson, of

the Republic Steel Corp. Creep resistance was found to be increased materially by an increase in the carbon content. Better creep properties were obtained from slow cooling in the heat treatment than from normalizing, other things being equal. The findings in the main are reported in the accompanying extended review of the joint paper by these investigators.

obtain the transverse specimens, short lengths were cut from the still tube, slit lengthwise, heated to about 1700 deg. F. and flattened, admittedly introducing further deformation but not very severe deformation compared to that involved in making the tube.

Five Different Heat Treatments

The major portion of the test data was obtained on the steels given the C or normal annealing treatment. The controlled cooling rate from 1500 deg. F. to 1300 deg. F. was for the purpose of duplicating in the small blanks the cooling rate normally attained in cooling a large mass, such as a still tube. The other heat treatments used were to evaluate the effects of various annealing temperatures, rates of cooling, grain size, and structure upon the creep and other mechanical properties determined.

The heat treatments used were as follows:

C—Normal annealing treatment. 1550 deg. F., 1 hr.; furnace cool to 1500 deg. F.; then 25 deg. per hr. to 1300 deg. F.; then furnace cool to 1000 deg. F.; then air cool.

A—Same as C, followed by reheating to 1425 deg. F. for 6 hr., then furnace cool.

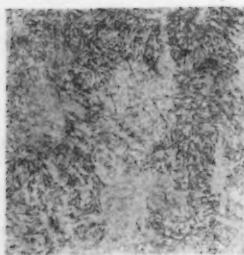
B—1550 deg. F., 1 hr.; air cool; reheat to 1425 deg. F. for 6 hr.; then furnace cool.

D—2100 deg. F., 1 hr.; air cool; reheat to 1425 deg. F. for 6 hr.; then furnace cool.

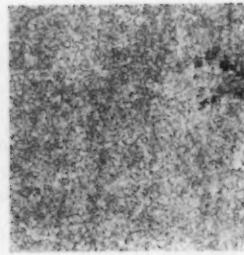
E—2100 deg. F., 1 hr.; furnace cool to 1500 deg. F.; then 25 deg. per hr. to 1300 deg. F.; then furnace cool to 1000 deg. F.; then air cool.

The A annealing treatment differs from C in the reheating for 6 hr. at 1425 deg. F. The reheating to 1425 deg. F. was required on the normalized samples to reduce the hardness

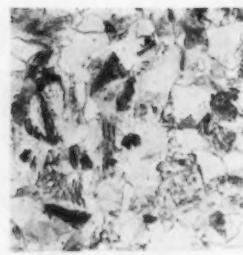
Fig. 1—Photomicrographs at 100 diameters, reproduced at two-thirds original size; etchant, 10 per cent nital



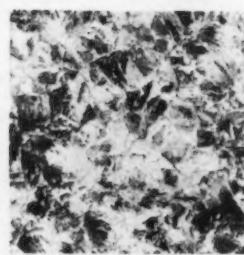
Steel IID: Normalized from 2100 deg. F. and reheated 6 hr. at 1425 deg.



Steel IIC: Slow cooled from 1550 deg.



Steel IE: Slow cooled from 2100 deg.



Steel IIE: Slow cooled from 2100 deg.

Still Tubes

to comparable values with the slow-cooled samples without changing the grain size resulting from the initial treatment. For comparison this reheating treatment was also added to the C treatment.

The E annealing treatment differs from C in the initial heating temperature of 2100 deg. F. instead of 1550 deg. This treatment afforded an opportunity to study the effect of structure and grain size resulting from slow cooling from the higher initial temperature.

The B and D treatments are normalizing treatments affording a comparison with slow cooling treatments A and E from the same initial temperatures. They also permit comparison of the effect of the different structures and increased grain size resulting from the two initial temperatures.

The identification of the various test specimens shows the steel number I or II, the heat treatment A, B, C, D, or E used, the direction of the test specimen in the still tube (longitudinal L, or transverse T, and the specimen number 1, 2, 3, etc. Thus IIC-T4 indicates that specimen is from steel No. II (higher carbon heat), given the C heat treatment, was a transverse specimen, and was the fourth specimen of its series.

In the examination of specimens for microstructure the etchant was 10 per cent nital. In Fig. 1 are shown photomicrographs of steel IIC with the normal annealing treatment and of steel IID with a normalizing treatment. These structures are characteristic of treatments C and A, and B and D, respectively.

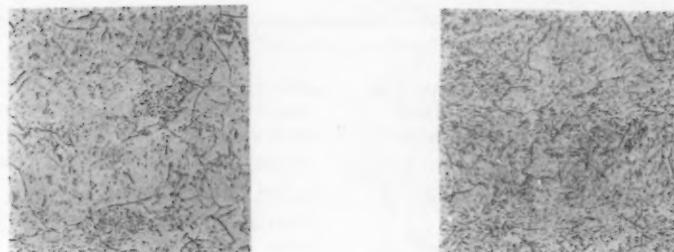
In Fig. 1 are also shown photomicrographs of steels IE and IIE with slow cooling from 2100 deg. F. These structures are decidedly different from those obtained by any of the other four heat treatments. The structure is decidedly non-uniform, and large pearlitic areas are present. These are more clearly shown at the higher magnifications in Fig. 2.

Steel IIC clearly shows shading, indicating directional properties.

Fig. 2—Photomicrographs at 500 diameters, reproduced at two-thirds original size; etchant, 10 per cent nital



Steel IC
Slow cooled from 1550 deg. F.
Steel IIC

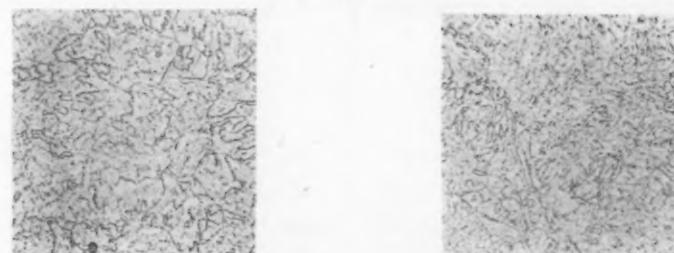


Steel IA
Slow cooled from 1550 deg. and reheated 6 hr. at 1425 deg. F.
Steel IIA

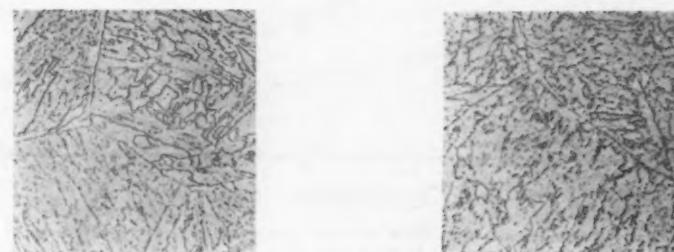


Steel IE
Slow cooled from 2100 deg. F.
Steel IIE

Fig. 3—Photomicrographs at 100 diameters, reproduced at two-thirds original size; etchant, 10 per cent nital



Steel IB
Normalized from 1550 deg. F.
Steel IIB



Steel ID
Normalized from 2100 deg. F.
Steel IID

USING material taken from finished oil-still tubes rather than material from bar stock of similar composition, Howard C. Cross, metallurgist, Battelle Memorial Institute, Columbus, Ohio, and E. R. Johnson, assistant chief metallurgical engineer, Republic Steel Corp., Massillon, Ohio, recently made an extended investigation of creep properties. They contributed the results of their tests to the American Society for Testing Materials, and their paper in large part was as follows:

Tubes Made from Two Heats of Steel

The steels used were of the 4 to 6 per cent chromium, 0.50 per cent molybdenum type and of two different carbon contents. The analyses of the other alloying elements were duplicated as closely as possible.

Two heats were melted in the plant of the Republic Steel Corp., using a 6-ton electric furnace and normal melting practice. The melts were cast in 20-in. round Gathmann type ingot molds. The ingots weighed approximately 4750 lb. each.

The ingots were rolled into blooms and then to 5½-in. rounds. The bars were sent to a tube manufacturer and fabricated into still tubes 5 in. O.D. and 5/8 in. wall thickness. In normal practice the tube manufacturer anneals the still tubes, but in this case the tubes were returned to Republic without annealing to permit variations in heat treatment.

Numerous chemical analyses of the two materials gave the results here tabulated.

COMPOSITION OF THE STILL TUBE MATERIAL

	Steel No. I	Steel No. II
Carbon, per cent.....	0.139	0.181
Manganese, per cent..	0.38	0.40
Sulphur, per cent.....	0.015	0.014
Phosphorus, per cent...	0.017	0.015
Silicon, per cent.....	0.35	0.35
Nickel, per cent.....	0.23	0.26
Chromium, per cent....	4.63	4.96
Molybdenum, per cent.	0.54	0.49

Blanks for preparation of longitudinal and transverse test specimens were cut from the finished tubes. To

Creep Properties of Oil-

USERS of oil still tubes, of the 5 per cent chromium and ½ per cent molybdenum class of steel, and for that matter the whole of the growing numbers of steel buyers interested in the behavior of steels at elevated temperatures, were given quantitative information at the meeting of the American Society for Testing Materials by Metallurgist Cross, of the Battelle Memorial Institute, and Metallurgical Engineer Johnson, of

the Republic Steel Corp. Creep resistance was found to be increased materially by an increase in the carbon content. Better creep properties were obtained from slow cooling in the heat treatment than from normalizing, other things being equal. The findings in the main are reported in the accompanying extended review of the joint paper by these investigators.

obtain the transverse specimens, short lengths were cut from the still tube, slit lengthwise, heated to about 1700 deg. F. and flattened, admittedly introducing further deformation but not very severe deformation compared to that involved in making the tube.

Five Different Heat Treatments

The major portion of the test data was obtained on the steels given the C or normal annealing treatment. The controlled cooling rate from 1500 deg. F. to 1300 deg. F. was for the purpose of duplicating in the small blanks the cooling rate normally attained in cooling a large mass, such as a still tube. The other heat treatments used were to evaluate the effects of various annealing temperatures, rates of cooling, grain size, and structure upon the creep and other mechanical properties determined.

The heat treatments used were as follows:

C—Normal annealing treatment. 1550 deg. F., 1 hr.; furnace cool to 1500 deg. F.; then 25 deg. per hr. to 1300 deg. F.; then furnace cool to 1000 deg. F.; then air cool.

A—Same as C, followed by reheating to 1425 deg. F. for 6 hr., then furnace cool.

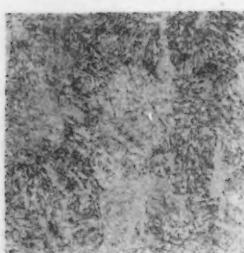
B—1550 deg. F., 1 hr.; air cool; reheat to 1425 deg. F. for 6 hr.; then furnace cool.

D—2100 deg. F., 1 hr.; air cool; reheat to 1425 deg. F. for 6 hr.; then furnace cool.

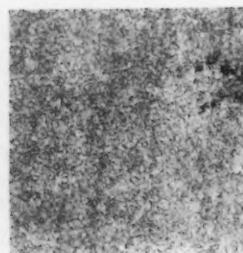
E—2100 deg. F., 1 hr.; furnace cool to 1500 deg. F.; then 25 deg. per hr. to 1300 deg. F.; then furnace cool to 1000 deg. F.; then air cool.

The A annealing treatment differs from C in the reheating for 6 hr. at 1425 deg. F. The reheating to 1425 deg. F. was required on the normalized samples to reduce the hardness

Fig. 1—Photomicrographs at 100 diameters, reproduced at two-thirds original size; etchant, 10 per cent nital



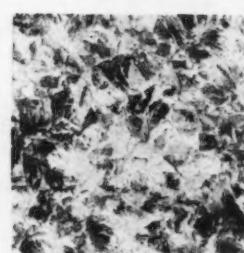
Steel IID: Normalized from 2100 deg. F. and reheated 6 hr. at 1425 deg.



Steel IIC: Slow cooled from 1550 deg.



Steel IE: Slow cooled from 2100 deg.



Steel IIE: Slow cooled from 2100 deg.

Still Tubes

to comparable values with the slow-cooled samples without changing the grain size resulting from the initial treatment. For comparison this reheating treatment was also added to the C treatment.

The E annealing treatment differs from C in the initial heating temperature of 2100 deg. F. instead of 1550 deg. This treatment afforded an opportunity to study the effect of structure and grain size resulting from slow cooling from the higher initial temperature.

The B and D treatments are normalizing treatments affording a comparison with slow cooling treatments A and E from the same initial temperatures. They also permit comparison of the effect of the different structures and increased grain size resulting from the two initial temperatures.

The identification of the various test specimens shows the steel number I or II, the heat treatment A, B, C, D, or E used, the direction of the test specimen in the still tube (longitudinal L, or transverse T), and the specimen number 1, 2, 3, etc. Thus IIC-T4 indicates that specimen is from steel No. II (higher carbon heat), given the C heat treatment, was a transverse specimen, and was the fourth specimen of its series.

In the examination of specimens for microstructure the etchant was 10 per cent nital. In Fig. 1 are shown photomicrographs of steel IIC with the normal annealing treatment and of steel IID with a normalizing treatment. These structures are characteristic of treatments C and A, and B and D, respectively.

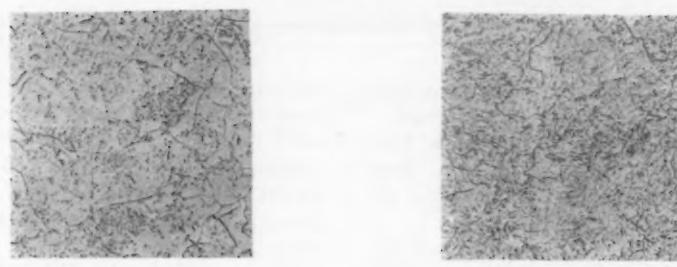
In Fig. 1 are also shown photomicrographs of steels IE and IIE with slow cooling from 2100 deg. F. These structures are decidedly different from those obtained by any of the other four heat treatments. The structure is decidedly non-uniform, and large pearlitic areas are present. These are more clearly shown at the higher magnifications in Fig. 2.

Steel IIC clearly shows shading, indicating directional properties.

Fig. 2—Photomicrographs at 500 diameters, reproduced at two-thirds original size; etchant, 10 per cent nital



Steel IC
Slow cooled from 1550 deg. F.
Steel IIC

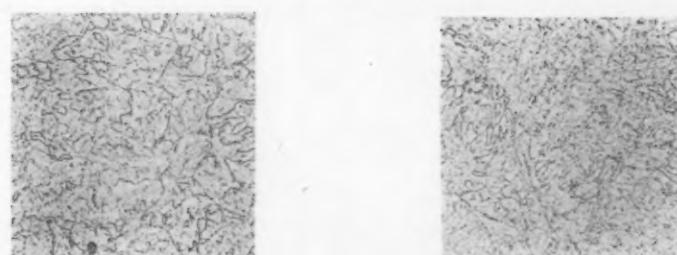


Steel IA
Slow cooled from 1550 deg. and reheated 6 hr. at 1425 deg. F.
Steel IIA

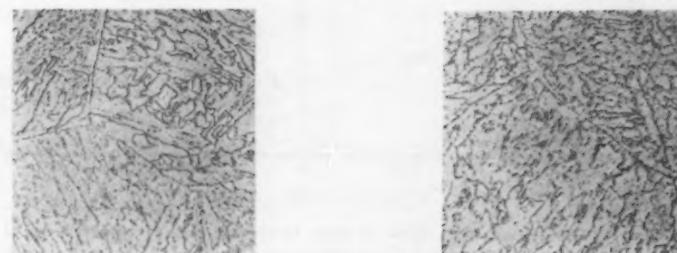


Steel IE
Slow cooled from 2100 deg. F.
Steel IIE

Fig. 3—Photomicrographs at 100 diameters, reproduced at two-thirds original size; etchant, 10 per cent nital



Steel IB
Normalized from 1550 deg. F.
Steel IIB



Steel ID
Normalized from 2100 deg. F.
Steel IID

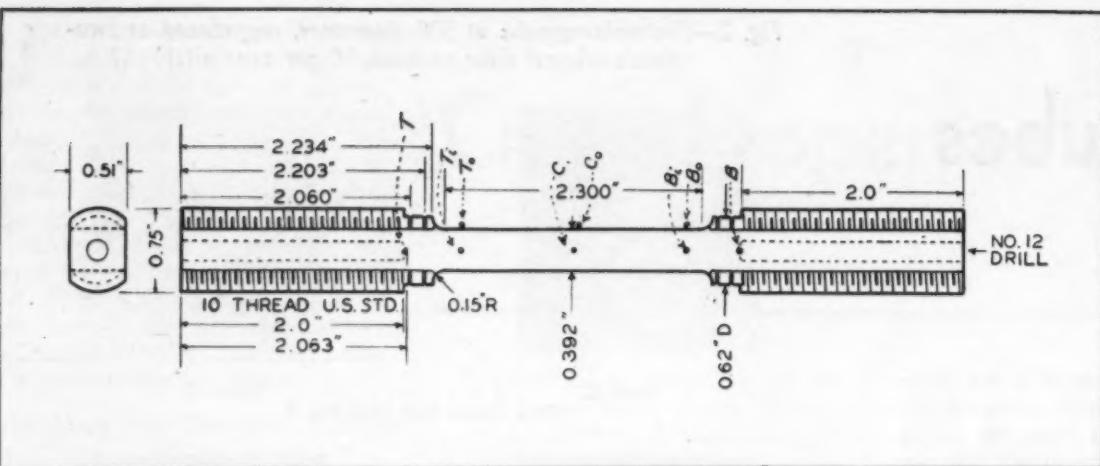


FIG. 4—Test specimen used in the short-time tensile tests at elevated temperatures and in the creep tests.

Otherwise the structure is quite uniform and the grains well defined.

Steel IID (Fig. 3) shows a non-uniform structure due to the local softening of the hard areas when reheated to 1425 deg. F.

Steels IC and IIC show a well defined grain, and the difference in amount of carbide in the two steels is apparent.

Steels IA and IIA show little, if any, effect due to the additional 6 hr. heating at 1425 deg. F. subsequent to treatment exactly the same as IC and IIC.

In Fig. 3 are shown photomicrographs at 500X of the steels of both

carbon contents with normalizing treatments followed by reheating at 1425 deg. F. The non-uniformity of structure of steels IB and IIB as compared with steels IA and IIA is clearly shown. Steels IB and IIB were normalized from 1550 deg. F., while steels IA and IIA were slow cooled from 1550 deg. F., and both were reheated to 1425 deg. F. for 6 hr. Steels ID and IID as normalized from 2100 deg. F. also show a non-uniform structure, but with a much larger grain size than for IB and IIB as normalized from 1500 deg. F. The structures as shown in Fig. 3 indicate the possibility of

structural changes taking place within the grains due to either the normalizing treatment or during the reheating at 1425 deg. F.

Test Specimen for Short Time Tests

A standard 0.505 in. diameter test specimen was used in the room temperature tensile tests. The yield point was determined by the drop of the beam. A few room-temperature tensile tests and all of the short-time tensile tests at elevated temperatures, as well as the creep tests, were made on bars with a rectangular test section.

Fig. 4 shows the details of the test specimen used. This type of test specimen was chosen because it was desired to test a representative section of a tube wall. The tube wall thickness was in the direction of the 0.51 in. dimension, so beginning with a tube of 0.625 in. wall thickness, about 0.055 in. has been machined off each side to obtain the finished test specimen with 0.2 sq. in. section.

The short-time tensile tests on bars with rectangular section were made in an Amsler hydraulic testing machine of 72,000 lb. capacity. The pull-adapters were fitted with spherical seats to assist in obtaining axial loading.

The heating furnace used in the short-time tests is 14 in. long, gap wound, and provided with taps to permit regulation of the current in various sections of the winding so as to obtain the desired temperature uniformity along the gage length of the test specimen. A temperature survey of the furnace was made according to the methods recommended in the A.S.T.M. tentative method of test, E21-33T. The thermocouples on the outside of the gage length were attached by spot welding.

Data of Creep Tests

The time-deformation curves for the creep tests at 1100 and 1200 deg.

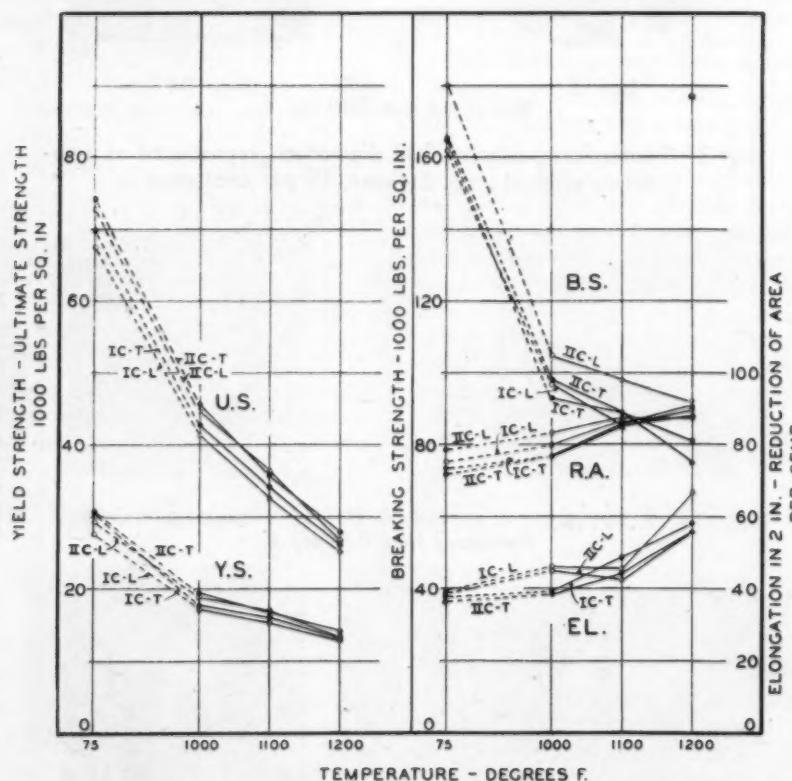


FIG. 5—What the tensile tests show at room temperature and temperatures of 1000, 1100 and 1200 deg. F., for the 4 to 6 per cent chromium and 0.50 per cent molybdenum steel tube; steel I having 0.139 per cent carbon and steel II, 0.181 per cent carbon; slow cooled from 1550 deg.; L, longitudinal specimens of tube material and T, transverse specimens.

F. are shown in Figs. 6, 7, 8, 9 and 10. The majority of the creep tests were made at 1100 deg.; tests at 1200 deg. were made on the steels with the C treatment at one load only.

The omission of the points on the time-deformation curves for specimens IIC-L6 and IIC-T4 in Fig. 7 was due to trouble with the elongation measuring equipment. The tests were continued, the temperatures and loads maintained meanwhile, and the difficulty corrected.

The X on the time-deformation curves signifies the inside surface of the still tubes.

In Fig. 11 are shown data for the total deformations calculated to result from the various stresses in 10,000 hr. These values were obtained by extrapolating the time-deformation curves at the same rate of elongation as existed over the latter part of the test period. This method gives a lower stress than the

TABLE I—Stresses for 1 Per Cent Deformation in 10,000 Hr. for Steels Given C Annealing Treatment and Tested at 1100 Deg. F.

Steel	Secondary Rate of Elongation	Total Deformation
IC-L	4200	4100
IC-T	3850	5800
IIC-L	5170	5100
IIC-T	4850	4850

stress producing a secondary elongation rate of the same magnitude, since the values for total deformation depend on the magnitude of the initial elongation as well as the secondary rates of elongation. However, the stresses for 1 per cent in 10,000 hr.

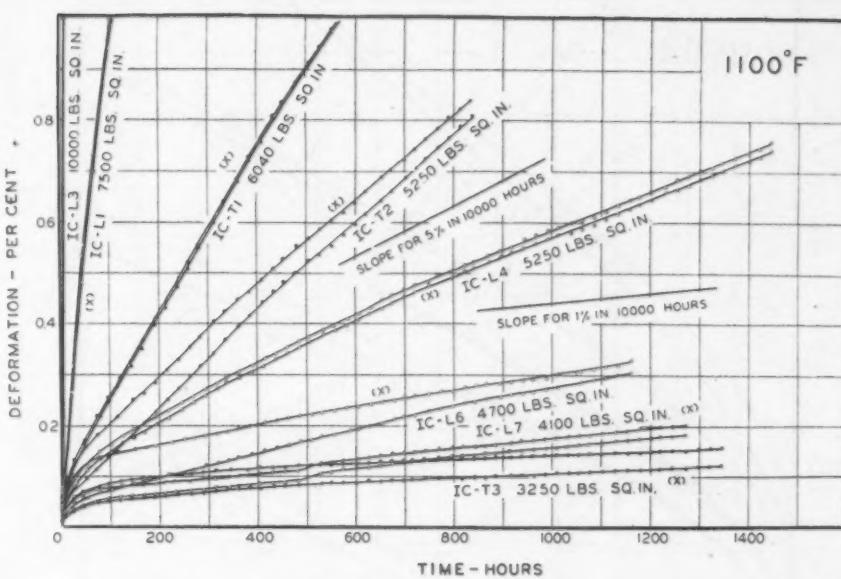


Fig. 6—Creep tests at 1100 deg. F. for the 0.139 per cent carbon still-tube material, slow cooled from 1550 deg. F.

are nearly the same, using both methods as is shown in Table I (Table VII of original paper).

Fig. 11 and Table I show that steel II with 0.181 per cent carbon showed superior creep resistance, with only one exception as compared with steel I with the slightly lower carbon content of 0.139 per cent. There is a difference in creep resistance of about 800 to 1000 lb. per sq. in. between the two steels.

In the tests at 1200 deg. F. at a load of 3000 lb. per sq. in. occurred the only instance in which steel I (treatment C) showed a lower rate of elongation than steel II.

The tests showed that the longitudinal specimens possessed better creep resistance than transverse specimens, given the same heat treatment. The difference in properties was small, however, and as shown in Table I the stresses for 1 per cent in 10,000 hr. varied only 300 to 350 lb. per sq. in. or less than 10 per cent.

For comparing the effects of the various heat treatments, creep tests were run at one load only, estimated to produce deformations of 5 per cent in 10,000 hr. For steel I the tests were run at 5250 lb. per sq. in. and for steel II at 6060 lb. per sq. in. Table II and Fig. 11 show the total

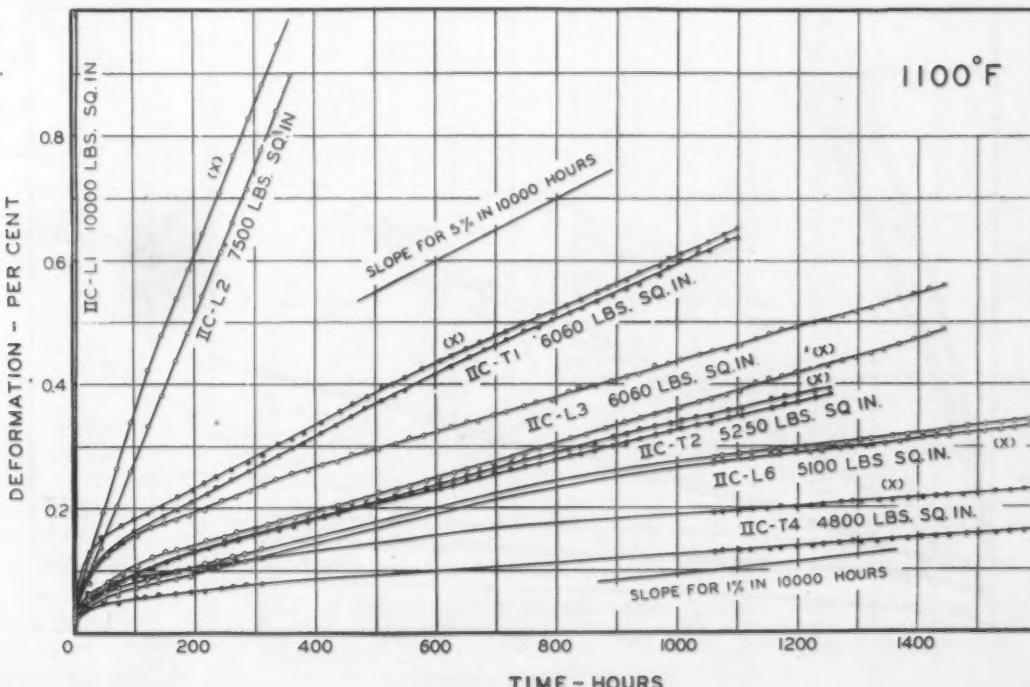


FIG. 7—Creep tests at 1100 deg. F. for the 0.181 per cent carbon still-tube material, slow cooled from 1550 deg.

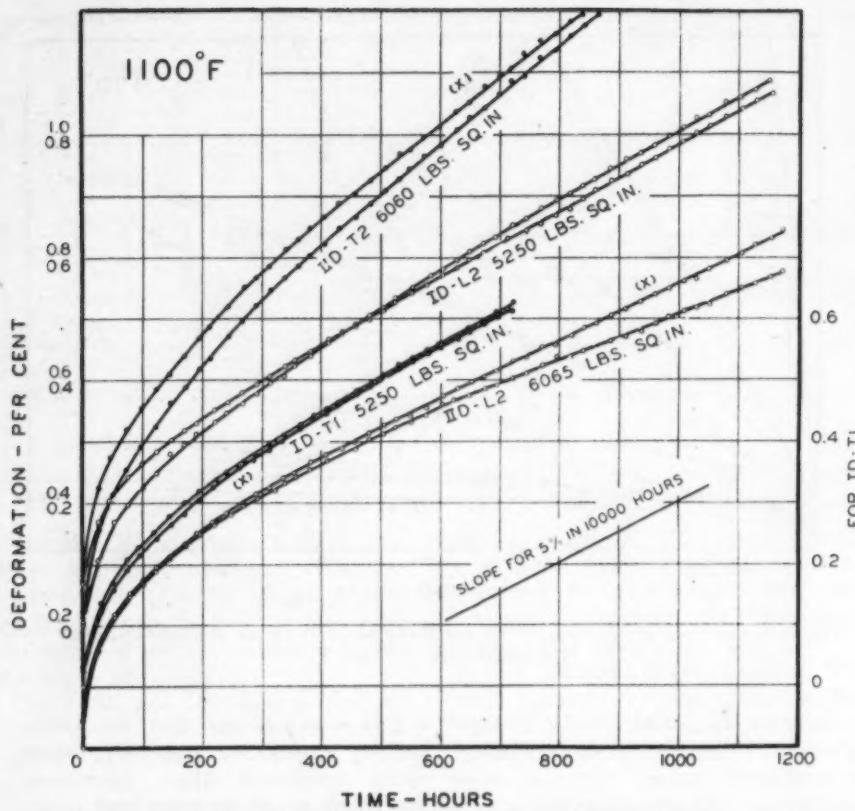


FIG. 8—Creep tests at 1100 deg. of the still-tube material for both carbons, the heat treatment in these cases being normalizing from 2100 deg. and reheating for 6 hr. at 1425 deg., comparing behavior of the longitudinal and transverse specimens; the shift of the zero to displace the curves is to be noted.

TABLE II—Estimated Per Cent Total Deformation in 10,000 Hr. at 1100 Deg. F.

Stress—5250 lb. per sq. in.—Steel I... .	Treatment C;		Treatment A;		Treatment E;		Treatment B;		Treatment D;	
	Slow Cool 1550 Deg. F.	Reheat 6 Hr.	Slow Cool 1530 Deg. F.	Reheat 6 Hr.	Slow Cool 2100 Deg. F.	Reheat 6 Hr.	Normalize 1550 Deg. F.	Reheat 6 Hr.	Normalize 2100 Deg. F.	Reheat 6 Hr.
Stress—6060 lb. per sq. in.—Steel II... .	4.31	5.31	0.39	20	5.53					
	2.61	2.61	0.59	22	4.51					

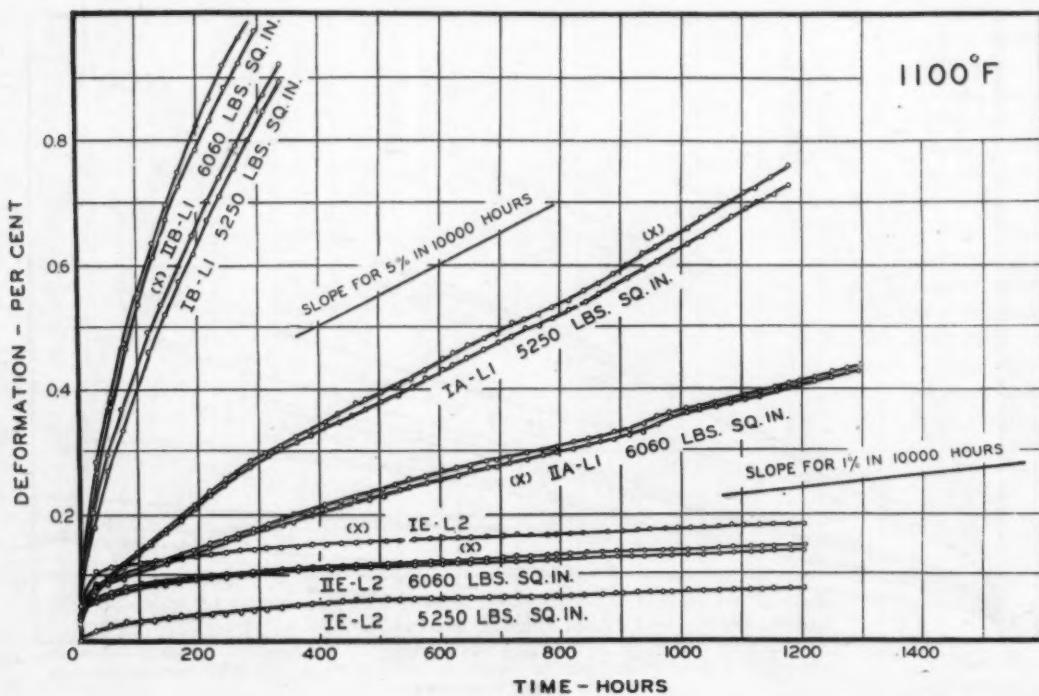


FIG. 9—These creep curves make a comparison of heat treatment A (slow cooling from 1550 deg. and reheating for 6 hr. at 1425), heat treatment B (normalizing from 1550 deg. and reheating 6 hr. at 1425) and heat treatment E (slow cooling from 2100 deg.).

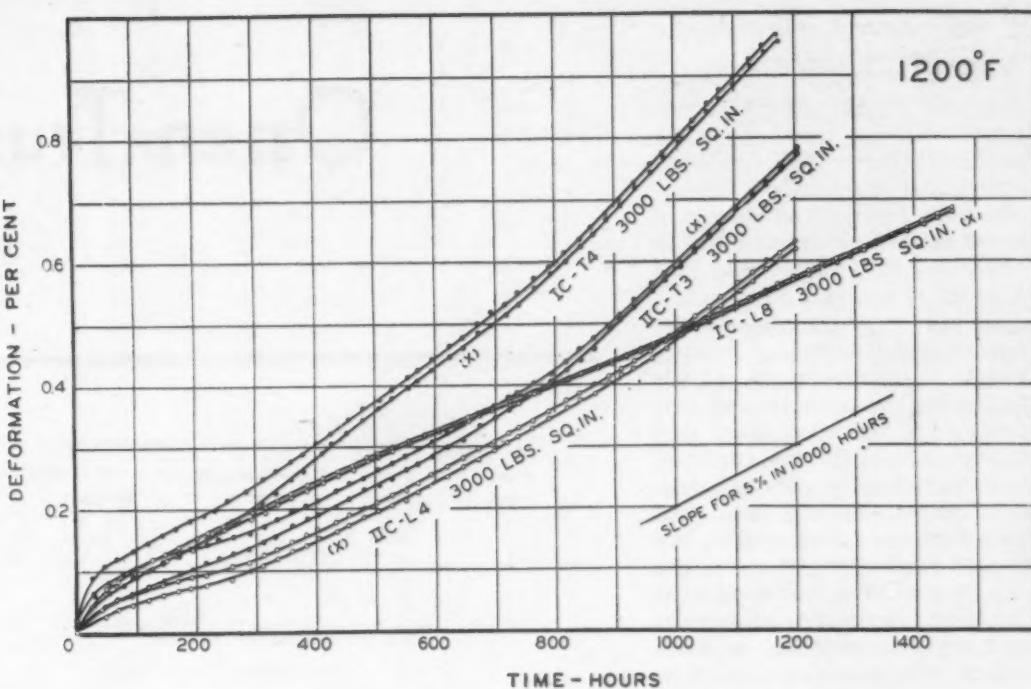
deformation estimated to result in 10,000 hr.

The creep resistance of the specimens given the C and A treatments seem about equal. Apparently the reheating at 1425 deg. 6 hr. in the A treatment has had little effect on creep properties. This is of particular interest, for it indicates that in service short periods of overheating would cause little effect on the creep properties of materials given the C treatment. This was expected, since the photomicrographs showed little difference between the two treatments.

The specimen given the B treatment (normalized from 1550 deg. F., reheated 6 hr. 1425 deg. F.) showed the poorest creep resistance. This indicates slow cooling rather than fast cooling to be preferred to obtain best creep properties in the 4 to 6 per cent chromium, 0.50 per cent molybdenum steel.

The specimen given the D treatment (normalized from 2100 deg. F., re-heated 6 hr. 1425 deg. F.) showed better creep resistance than treatment B as normalized from the lower temperature. However, its creep resistance was not equal to that given by the normal anneal C.

Since the large grain resulting from treatment D gave better creep resistance than treatment B, it was thought advisable to determine the creep resistance of several specimens slow cooled from 2100 deg. F. with the thought that better creep resistance might be obtained than from treatment C due to the higher heating temperature. This has proved to be the case, for the time-deformation curves shown in Fig. 9 and the data



in Table II indicate a lower rate of elongation for specimens given the *E* treatment than for any of the other four treatments.

However, it should be kept in mind that this *E* treatment produced a very low impact resistance which would prohibit its use regardless of its superior creep resistance.

These data suggest that possibly better creep resistance than produced by treatment C (slow cool from 1550 deg. F.) could be secured by slow cooling from a somewhat higher temperature than 1550 deg. F., which would not at the same time affect the impact resistance of the material appreciably. It should be borne in mind that the excessively high temperatures were used only to produce maximum structural differences so that good comparisons could be made.

Physical Properties After Creep Test

Photomicrographs were made after creep test of the structure of specimens IC-T3 (1346 hr. at 1100 deg. F. loaded in 3250 lb. per sq. in.) and IIC-T4 (1596 hr. at 1100 deg. F. loaded to 4800 lb. per sq. in.) There was no detectable change in the microstructure from that shown in Figs. 1 and 2 for the two steels with the C treatment before test. This was as expected, since slow cooling should tend to produce a stable structure. Since no differences were noted, the photomicrographs are not shown.

Short-time tensile tests were made on four longitudinal specimens at the same temperature at which they were tested for creep. There were only small reductions in yield and ultimate

strengths and ductility values. These data further indicate the stability of the two steels given the *C* treatment.

Izod impact tests using both key-hole and "V" notches were made on specimens of all treatments after creep test. The "V" notch seemed more selective, in that it indicated greater differences than the key-hole notch.

Loss of impact resistance was less than 10 per cent for longitudinal and transverse specimens of both steels with treatment C tested with key-hole notch after creep test at 1100 deg. F. A larger reduction was noted when using the "V" notch, but the material

still showed good ductility. For transverse specimens, whose initial impact resistance was lower than for longitudinal specimens, for steel I the drop was from 71 to 61 ft.-lb. and for steel II it was from 76 to 54 ft.-lb.

For treatment D steel I dropped from 104 to 83, and steel II from 101 to 85 ft.-lb. after creep test at 1100 deg. F. After creep test at 1200 deg. F. both steels showed impact resistance at about 50 ft.-lb. as compared with original values of 71-76 ft.-lb.

Specimens of both steels given the A or B treatments show practically
(Concluded on Page 68)

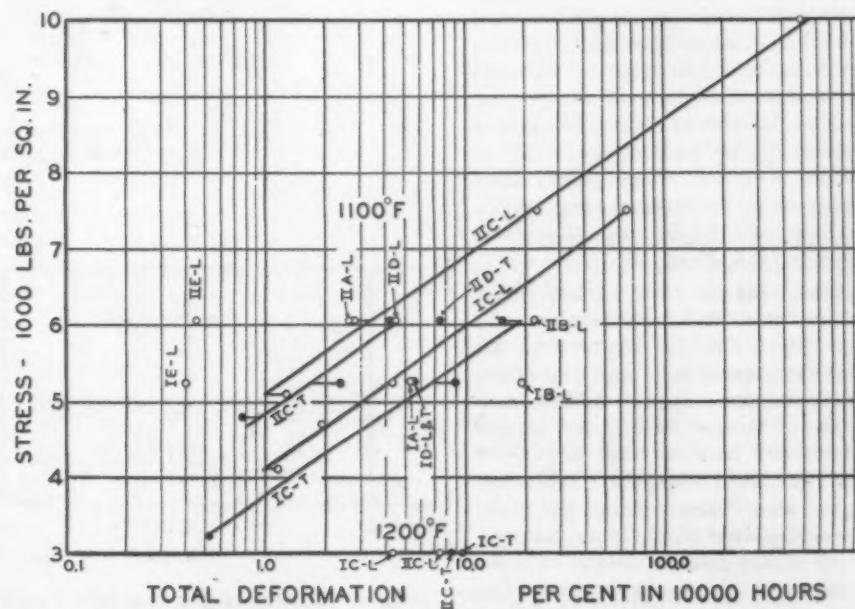


FIG. 11—The deformation, in percentage in 10,000 hr., which different stresses will produce on the 4 to 6 per cent chromium and 0.50 per cent molybdenum still-tube material, according to the heat treatment given it, as designated by letters explained in the text.

FIRST utilizing sheets as the basic material (and as early as 1855), metal joists—signifying by that term a substitute for wooden beams—did not really get under way until about ten years ago. And in this later development, the emphasis has been placed on a form of construction that does not so much seek to displace wood as it is aimed to satisfy a demand that does not require primarily the weights and strengths of existing structural shapes. In the growth succeeding, the product of the sheet mill has in part given way to the product of the bar mill, and this because in no small measure electric welding was being turned into a constructing tool of unusual flexibility. The open-truss joist of steel bars assembled with the help of welding is believed to have an expanding future even outside the purely construction field.

Open-Truss Steel And

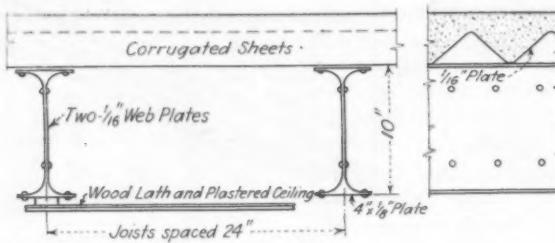


FIG. 1.—What is known as the Renwick joist was used in the Bank of the State of New York building erected in 1855 at William Street and Exchange Place, New York, and razed in 1903.

EFFORTS to substitute steel for wood undoubtedly account for the first use of the primitive forms of steel joist, and by tracing the developments we shall see how the modern, approved type resulted.

Historically, the first known use of metal joist construction was in the five-story Bank of the State of New York Building, formerly located on William Street near Wall Street, New York. James Renwick was architect of this building, which was erected in 1855 and taken down in 1903. The metal joists were made of wrought iron and the floor design was as shown in Fig. 1. When the building was demolished the sections were in excellent condition, and photographs plainly show the original shop marks. For complete report, see the *Engineering News*, Sept. 10, 1903.

From 1885 to 1895 various other sections were designed, as shown in Fig. 2 and Fig. 3. These were all made from sheet steel and, therefore, limited to short spans. In the case of the Chicago joists, the angles were bolted back to back and there were no lower flanges. Stiffening angles were bolted along the web. Corrugated steel sheets were fastened on top of the joist by means of nails driven into the joint between the webs. Concrete was laid on top of the corrugated sheets and a metal ceiling to carry plaster was hung from the joist. This construction was used



FIG. 2.—The St. Louis joist, made from No. 20 gage sheets, was used in a number of buildings in St. Louis, particularly in partitions, from 1887 to 1890.

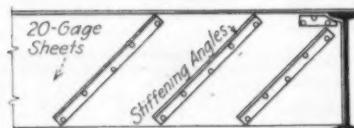


FIG. 3.—The Chicago joist, patented by T. O'Shea and manufactured in Chicago from 1887 to 1893, used stiffening angles to prevent buckling of the web and to help take diagonal stresses.

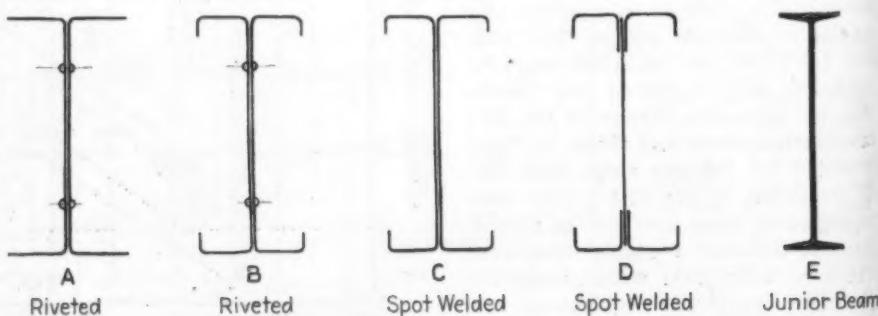


Fig. 4.—The forms of strip steel joists, leading up to the development of the junior rolled steel beam.

Joist, Its Genesis Future

By GEORGE C. PINGER
General Superintendent,
Concrete Steel Co., New York

quite extensively in Chicago between 1901 and 1905.

Attempts to market these various sections were only local, and because of short lengths of sheets available, little progress was made. Increased production facilities for the manufacture of sheet metal and improved equipment for working this material caused the Berger Mfg. Co., Canton, Ohio, to start the making of a sheet steel joist in 1908. The Berger joist was designed as shown in Fig. 4-A, and was made entirely from Nos. 15 and 16 gage sheet steel on a brake (bending machine). Sections over 10 ft. long had to be spliced, which was an expensive operation and gave an inefficient joist. During the period from 1908 to 1917 some improvements were made toward increasing the unspliced lengths to 16 ft. About 1915 the roll forming method of making the sheet steel joist plus the coming of widened strip steel accelerated its production.

It is further interesting to follow the development of sheet steel joist by reference to a paper read before the American Iron and Steel Institute in 1921 by Thomas J. Foster on "Sheet Lumber." One paragraph will show the tendency at that date and also that the steel mills were beginning to recognize the growing demand for this product. "Steel Lumber consists of light structural steel members in the form of I-beams and channels of approximately one-third the weight of standard sections of equal depth and primarily designed to fulfill the function of wooden joists and studs."

The sections shown in Fig. 4, made from strip steel formed to shape and either riveted or spot welded together when used as joist in floor construction, reduced the dead weight of the floor construction to 40 lb. as compared to 80 lb. in some of the other types of fireproof construction. Buildings of light floor load design were built in various parts of the country using the sheet metal joist, as it was labeled by one engineer:

The extensive use of the "metal lumber" led to the perfection of a rolling mill for the production of "Junior Beams," Fig. 4-E, in which the thickness of flanges and web was reduced to less than $\frac{1}{8}$ in., and the weight per foot to approximately the

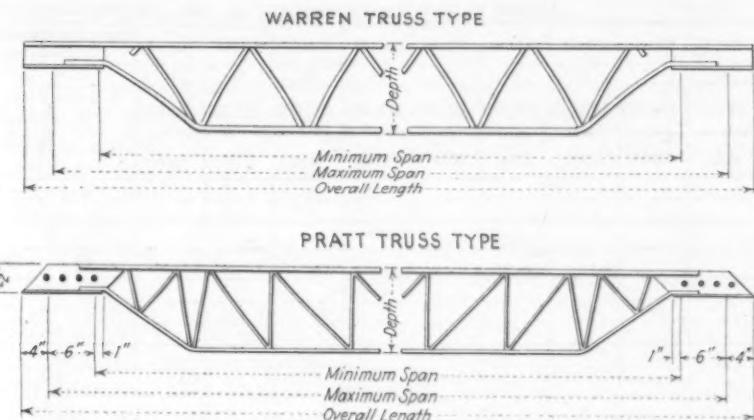


Fig. 5—The design of the open-truss joist follows along the lines long used for built-up structural steel trusses.

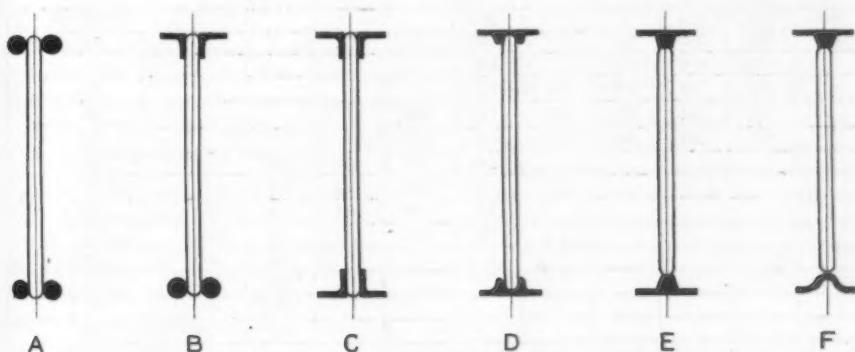


Fig. 6—Bars used in various designs of open-truss joists.

- A, uses plain round bar throughout
- B, top chord has two angles but other members are plain round bars
- C, top and bottom chords are of angles and the web of plain round bars
- D, uses special twin tee section top and bottom, with round bars for the web
- E, uses tee section for top and bottom chord and plain round bars for the web
- F, uses a special tee section for the top chord, a pressed metal bottom chord section and plain round bars for the web.

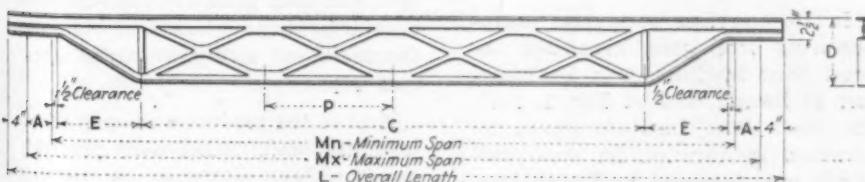


Fig. 7—The expanded I-beam, made by slitting a special section lengthwise at intervals and then opening up the slits, is typified by the Kalman joist.

same as the built-up sheet metal joist. From this we see the recognized demand for a light weight steel section which could be produced either by fabricating strip steel or by direct rolling by the steel mills. Meanwhile the solid I-beam type of steel joist met with restrictions of building codes that did not allow until very

assembled from standard rolled bars, angles and sections which can be readily produced by bar mills. The products of these mills are fabricated in shops especially arranged to produce "steel joist."

The design of the open truss joist follows along the same lines used by structural engineers for built-up

used for floor filling between the main supporting girders, beams or walls." There are about a dozen fabricators of steel joist now operating, and all of the members of the Institute make their product to conform to the Institute specifications, so that architects and engineers have dependable data for use in design, much similar

Properties and Allowable Total Loads in Pounds per Linear Foot of STEEL JOIST INSTITUTE STANDARD Open Web Steel Joists													In accordance with Simplified Practice Recommendation No. R-94-30 of the Bureau of Standards, U. S. Dept. of Commerce.		
American Institute of Steel Construction Stresses.													Adopted by Steel Joist Institute Aug. 20, 1929. Effective Jan. 1, 1930		
Steel Joist Institute Designation	SJ81	SJ82	SJ102	SJ103	SJ104	SJ123	SJ124	SJ125	SJ126	SJ145	SJ146	SJ147	SJ166	SJ167	Steel Joist Institute Designation
Depth In Inches	8	8	10	10	10	12	12	12	12	14	14	14	16	16	Depth In Inches
Resisting Moment In Inch Pounds	29,500	52,500	63,000	82,000	100,000	92,000	115,000	142,000	175,000	156,000	205,000	246,000	232,000	281,000	Resisting Moment In Inch Pounds
Maximum End Re- action In Pounds	1600	1900	1900	1950	2200	2200	2300	2500	2700	2900	3100	3400	3200	3600	Maximum End Re- action In Pounds
Span 4 Feet	800														Span 4 Feet
5	640														5
6	530														6
7	402														7
8	308														8
9	243														9
10	197	350													10
11	162	289													11
12	137	243	292												12
13	116	207	248												13
14	100	178	214												14
15	87	155	187	243		272									15
16	77	137	164	213	260	240									16
17		145	180	230	212										17
18		130	169	205	189	236									18
19			116	151	184	170	212			288					19
20			105	137	167	153	192	237		260					20
21						139	174	215		286					21
22						127	158	196	241	215					22
23						116	145	179	221	197	258				23
24						106	133	164	202	180	237				24
25										166	218	262	247		25
26										154	202	243	229		26
27										143	187	225	212	257	27
28										133	174	209	197	239	28
29												184	223		29
30												172	208		30
31												161	195		31
32												151	183		32

*Note. These Joists are not produced by all Manufacturers.

recently of steel for structural use less than 5/16 in. thick.

"About 1923," says Rudolph P. Miller, in the *Quarterly* for October, 1931, of the National Fire Protection Association, "the Massillon Bar Co. (later, the Macomber Steel Co.) abandoned the manufacture of the strip steel joist and introduced the open-truss joist, which has since become the generally accepted type."

For the past 10 years, following the general acceptance by architects and engineers of the "open truss joist," there has taken place a notable development in its manufacture and use. This product is sometimes called "bar joist" for the reason that it is

structural steel trusses, except that the connections for the various members are held together by either the electric pressure weld or arc-weld process, in place of using gusset plates and riveted joints. Fig. 5.

In 1928 various companies manufacturing steel joist organized the Steel Joist Institute, with headquarters at Detroit, and on Feb. 1, 1929, the Steel Joist Institute issued its standard specification for steel joist which was prepared by Frank Burton after months of study. The term steel joist (as defined by the Institute specifications) means "any steel beam or truss-shaped steel member suitable for supporting floors and roofs when

to shape books published by the structural steel mills.

The accompanying table gives properties and allowable loads for various spans and various depths of open web steel joist. Numerous tests have been made which indicate that the factor of safety averages more than 2½.

Most of the producers of open truss joist use plain round bars for web members bent to shape and welded to the top and bottom chords. However, the sections used for these top and bottom chords differ extensively. Fig. 6 shows some of the variety of designs.

Parallel to the development of the open truss joist, there appeared an I-beam joist which is made by slitting a special section lengthwise at intervals, followed by heating, after which the slits are opened or expanded. This joist approximates very closely the bar type joist in weight and physical properties.

The steel joist has been applied to a great variety of buildings—schools, auditoriums, hospitals, public buildings, office buildings, stores, garages and first-floor residential construction. Their use requires ample bridging between joists to stiffen the entire structure. After pipes, conduits, etc., are installed, ribbed metal lath is fastened to the top chord over which is placed a 2-in. thickness of concrete covering the entire floor area. Metal lath is hung from the bottom chord members and plaster is applied in the usual manner.

For direct wood floor construction (omitting the metal lath and concrete) wood nailing strips are rigidly fastened on the top chord members of the joists and the wood floor nailed directly to same. This form of open truss nailer joist is quite extensively used also for roof purlins in factory and mill type of building and on account of light weight saves substantially in the dead weight of roof construction.

The potential market for first-floor application in residential construction offers a great field when the merits of this form of floor joist become more generally recognized.

Other uses for the open truss joist have become quite evident. One that seems to offer possibilities lies in the heavy type of reinforced concrete building for concrete beam reinforcing. By supporting joist at the ends, the forms are hung from it, thus eliminating the need of expensive shoring.

Another application is for roadways on large and small bridges. One of the first large installations was the Camden and Philadelphia suspension bridge. This project has been watched carefully by bridge engineers and the results have been so satisfactory that this type of bridge floor or roadway has been adopted for the San Francisco-Oakland Bay bridge.

Other applications of welded bars in the form of mats much similar to joists are used generally throughout the country for reinforcement of bank vaults.

Manufacturers of steel joist were first primarily interested in develop-

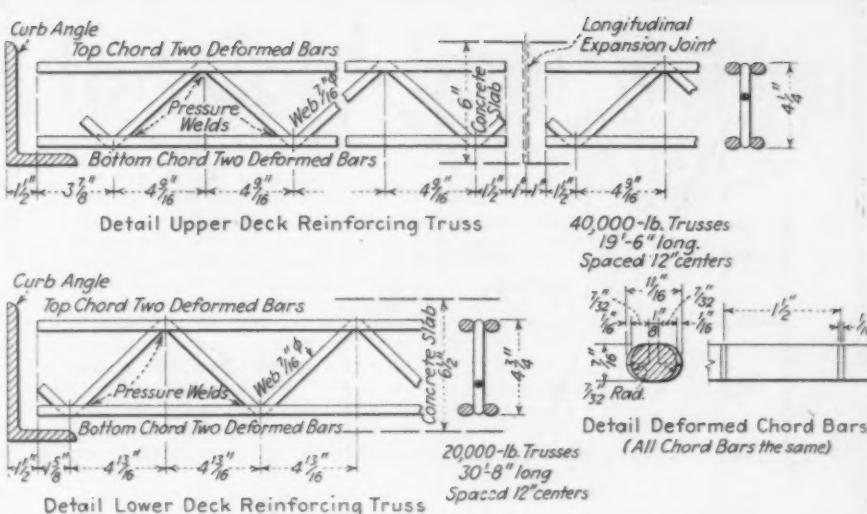


FIG. 8—An illustration of the vogue of the bar joist is given in the provision for 60,000 reinforcing trusses for the roadways of the San Francisco-Oakland Bay Bridge.

ing a substitute for wood joist that was fire resistant. Practically all efforts were directed to a very large field with a rather limited application, starting with sheet steel as a basic material. Covering a considerable period of time, various types were evolved, each in turn superseded by improvements in design and method of manufacture. Certain handicaps developed both as to the design and form of steel, and these were overcome by using steel bars. Another factor which materially contributed to the change and the success which resulted was the rapid application of electric welding as an approved tool for use by steel fabricators. On account of the flexible requirements necessary in plants for fabricating the open truss joist, other applications of steel bars electrically

welded in suitable shapes found their way into these plants.

It seems reasonable to expect that the open truss steel joist of the present general design has established itself as a permanent product and that it will not be changed very materially in the future. Its use will continue to expand on account of the large potential market available and that in turn will result in an increased consumption of bars.

Determination of small amounts of zinc in steels and irons is the subject of Research Paper RP664 of the Bureau of Standards, obtainable from the Superintendent of Public Documents, Washington, at 5 cents a copy. H. A. Bright is the author.

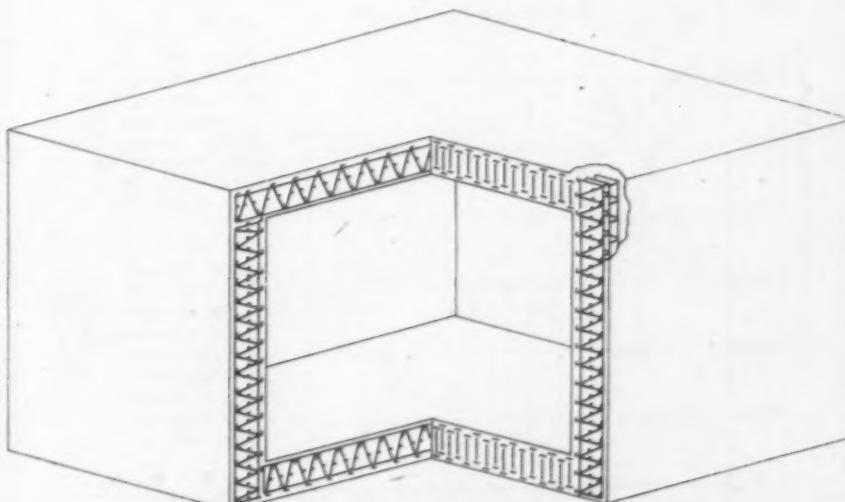


FIG. 9—The joist form of welded bars shows a use to make mats to take the place of armor plate in bank vaults.

Power Requirements

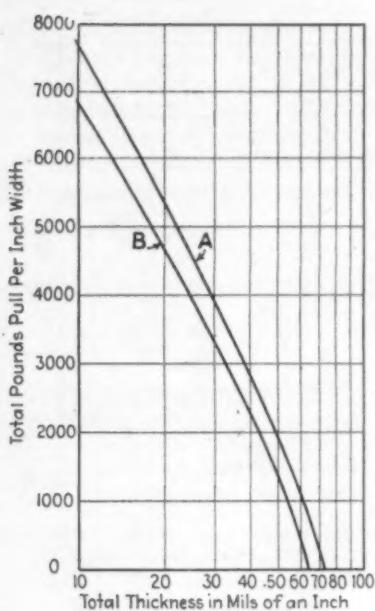


FIG. 1—"A"—Steckel reversing cold strip mill, 3-in. diameter work rolls. Delivery speeds about 400 ft. per min. All tension—no motor on main rolls. No deduction made for any back tension. Average of two coils. Rolled from 0.072 in. x 14 in. wide to 0.009 in. in 13 passes. "B"—Single-stand non-reversing mill and reel, 12-in. diameter work rolls. Delivery speeds about 500 ft. per min. Motor on work rolls and on reel. No allowance for back tension, if any. Reel tension 15 to 50 per cent of total pull. Rolled from 0.063 in. x 18 3/4 in. to 0.0095 in. in five passes.

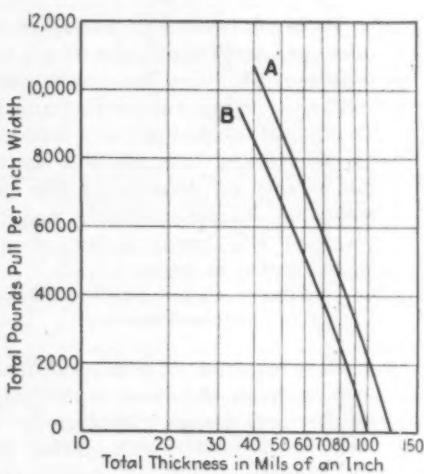


FIG. 2—Reversing cold strip mill. Main roll motor—1500 hp, 200 to 400 r.p.m.; 20-in. x 84-in. work rolls, 250 to 500 ft per min. Reel motors, two 700 hp, 150 to 525 r.p.m., 30 to 43.5 in. reel diameter. "A"—rolling 0.120 in. x 69 in. to 0.040 in. in five passes. Average of two coils. Mild steel; 250 to 500 ft per min. delivery speeds. Approximately 20 per cent drafts. "B"—rolling 0.100 in. x 39 1/2 in. to 0.0355 in. in five passes. Average of two coils, mild steel, 250 to 550 ft. per min. delivery speeds. Approximately 20 per cent drafts.

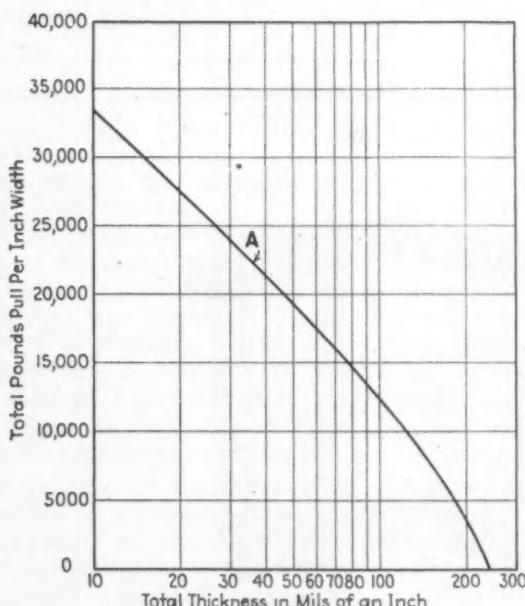


FIG. 3—Reversing cold strip mill. Main roll motor—1500 hp, 100 to 300 r.p.m., 16 1/2 in. x 44 in. work rolls, 400 to 1200 ft. per min. Reel motors, two 800 hp, 250 to 750 r.p.m., 30 in. min. reel diameter. "A"—rolling 0.24 in. x 30 in. to 0.011 in. in about 11 passes. Average of four coils, mild steel, 100 to 600 ft. per min. delivery speeds. Approximately 30 per cent drafts first seven passes to 10 to 15 per cent drafts last four passes.

T is the purpose of this article to present to the industry such data as are available on the power requirements for cold-rolling strip. These data are presented in such a form as to be conveniently usable in determining the horsepower capacity necessary to drive a particular stand or to take a particular amount of draft at a particular speed. These data represent the best information available today, but additional checking and tests on other mills will be valuable, and it is hoped that such information will be made freely available.

The data included in this article were taken from:

1. Tandem mills.
2. Reversing cold-strip mills with power applied to the main work rolls and to both reels.
3. Reversing cold-strip mills with power applied to the reels only (Steckel type).

The power requirements are plotted in the form of curves showing the total pounds pull per inch of width as compared with the total thickness in mils. This makes a very convenient form of curve, since the entering thickness and previous cold-rolling history of the particular strip under consideration can be seen at a glance. Plotting the actual thickness in mils of the strip makes unnecessary any calculations of elongation. The total pounds pull per inch of width makes a convenient ordinate. Whether this pull comes from the tangential force on the main work rolls, or whether the pull is applied directly to the strip by means of power-driven reel, is immaterial so far as the use of these terms to determine motor horsepower is concerned.

The meaning of the term "total pounds pull per inch of width" may be visualized by assuming that a piece of strip 1 in. wide is being pulled through the rolls of a mill by means of a spring balance fastened to one end of the strip. For each pass, the pull indicated by the balance and the thickness of the strip are read and recorded. Then the total pounds pull per inch of width which corresponds to the thickness after any pass is the sum of the readings of the spring balance for that pass and all preceding passes.

A warning is necessary concerning the use of this form of ordinate, par-

Requirements for Cold-Strip Rolling

ticularly when translating from one form of ordinate to another, but for practical considerations in determining motor horsepower with ordinary drafts in each pass, this difficulty is of no practical importance. This point will be discussed later.

There are plotted curves 1 to 6, each curve representing data taken on an individual mill. Curve 7 shows these curves plotted as a family to indicate how they conform to the same general pattern.

The tentative conclusion which may be drawn from these curves is that the net energy per unit weight of metal rolled is practically independent of the following factors, so far as determining the main-roll motor capacities is concerned:

- (A) Type of mill, whether tandem, reversing or Steckel type. (All mills were of the four-high roller-bearing type.)
- (B) Work roll diameter.
- (C) Delivery speed of metal, at least within the range of speeds covered by these tests. (That is, the work done is independent of the delivery speed of the metal, but the horsepower would, of course, be proportional to the delivery speed.)
- (D) Per cent draft taken. (That is, within limits, the energy consumption is independent of whether a piece of metal is reduced to a certain thickness in five passes or in 13 passes.)

The previous cold-rolling history of the strip makes a considerable difference in the energy required. That is, it requires more energy to cold-roll from 0.07 to 0.01 in. if the metal has been previously cold-rolled from 0.2 or 0.4 in. down to 0.07 in. than if the 0.07-in. thick material has come directly from the hot strip mill without any cold-rolling. In short, the more cold-rolling, the harder the metal becomes.

All of the data shown in the curves is for mild steel which has been given only the usual pickling treatment after it has come from the hot-strip mill. No data are available on alloy steels.

The controversial nature of the above conclusions is realized and it is quite possible that some of them may have to be modified as more data are published. It is hoped that such information may be published, particularly on alloy steels, since it is upon such information that the mill builders and the electrical manufacturers must base their recommendations for

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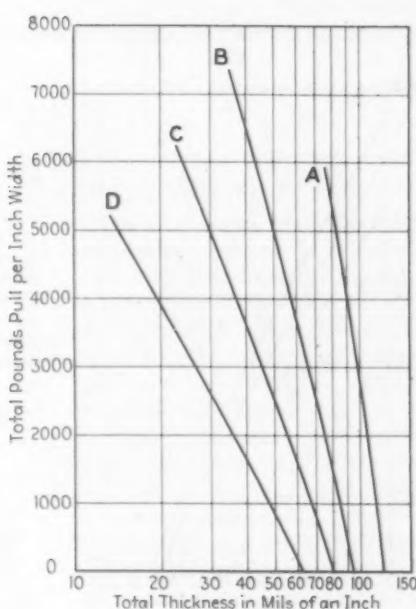


FIG. 4—Tandem cold strip mill. Three stands and reel. Main roll motors, 500 hp., 250 to 750 r.p.m. Work roll diameters, 11 in. to 19 in. Reel motor, 80 to 130 to 130 hp., 225 to 400 to 1125 r.p.m. Each curve average of about 10 coils. Final delivery speed 250 ft. per min. Drafts run about 25-18-10 mils. Steel analysis C 0.090, Mn 0.37.

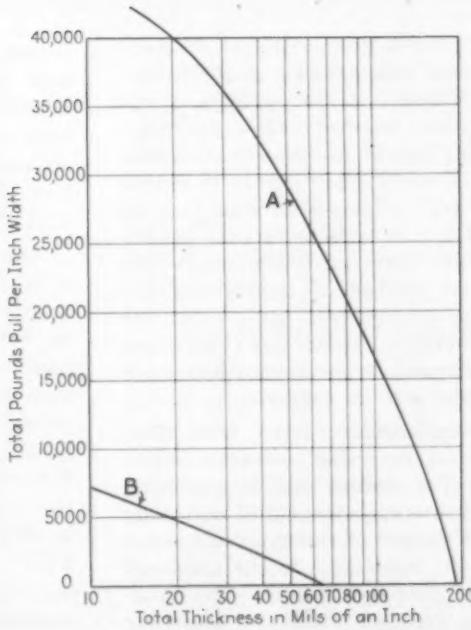


FIG. 5—Reversing cold strip mill data from "Iron and Steel Engineer," March, 1934, A. F. Kenyon. Main roll motor—1250 hp., 125 to 250 r.p.m., 16-in. x 42-in. work rolls, 525 to 1049 ft. per min. Reel motors, two 600 hp., 200 to 800 r.p.m., reel diameter 30 in. to 48 in. "A"—rolling 0.190 in. strip to 0.010 in. in eight passes. Mild steel. "B"—rolling 0.065 in. strip to 0.010 in. or 0.009 in. in three or four passes.

motor capacity required when an entirely new mill is proposed. It is therefore to the interest of the entire industry that such information be collected and published.

Construction of Curves

The volts and average amperes for each pass of the mill have been recorded and the net kilowatt input to each motor calculated. The pounds pull per inch of width is determined by the relation:

$$\text{Pull per in. width} = \frac{(\text{kW. input}) (0.9 \text{ eff.}) (33,000)}{0.746 (\text{inches width}) (\text{ft. per min.})}$$

Since the data so taken are not usually accurate to within plus or minus

In the case of tandem mills, with strip taut between stands, it is impossible to separate the individual motor input into the amount going into the reduction in that particular pass and into the amount being transmitted to the next stand by the tension in the strip. Likewise, the power input to the reel motor may be helping the last stand take its reduction, or it may be passed on to one of the preceding stands. These facts tend to make the individual points on the curves somewhat irregular. These irregularities are "ironed out" in plotting the curves—making sure, however, that the final total is correct.

The curves are plotted with total

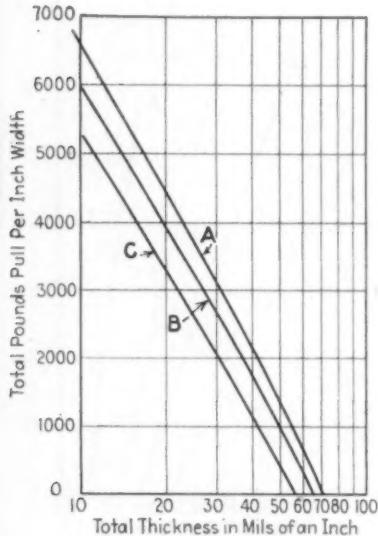
The horsepower for this particular pass then is:

$$\text{Hp.} = \frac{\text{pounds pull} \times \text{ft. per min.}}{33,000} = 404 \text{ hp.}$$

If it is desired to translate any of the curves from pounds pull per inch of width to horsepower hours per ton, the relationship between one system and the other is:

$$\text{Hp. hr.} = \frac{0.0003}{\text{Ton}} \times \frac{\text{lb. pull}}{\text{(thickness inches)}} \times \frac{\text{inch width}}$$

This relationship is true only between small increments of draft or thickness. It is not true for totals or summations covering a large number of passes. In translating from one system to the other, the total ordinate should be broken up into individual

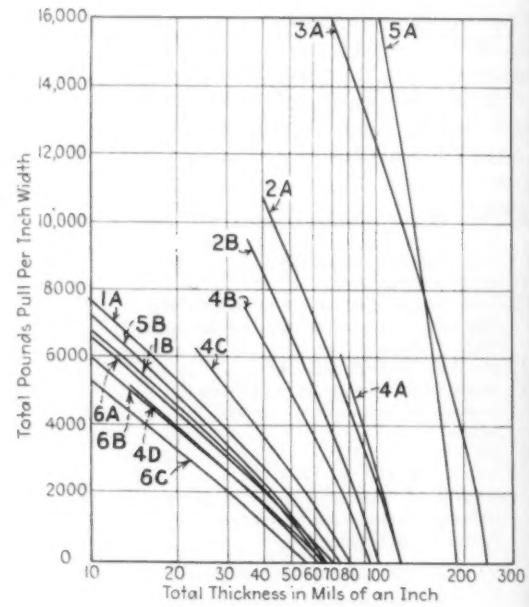


AT LEFT

FIG. 6—Tandem cold strip mill and reel work rolls, 18 in. x 40 in. Reel diameter, 20 in. Each curve is the average of three or four coils. Individual coils vary from 5 to 15 per cent from average. Five passes without annealing between. Final delivery speeds 200 to 400 ft. per min. Mild steel. Material 24 in. to 36 in. wide.

AT RIGHT

FIG. 7—Comparison of curves Figs. 1 to 6.



5 per cent, a greater degree of accuracy than that afforded by the 0.9 efficiency factor in the net input to the strip is not justified. The exact chemical analysis of the steel is not available in every case; nor is it known what type of lubricant was used on the strip. It is believed that pounds pull per inch of width offers the simplest method of determining the horsepower required for a given set of conditions. Hence this calculation, in preference to horsepower hours per ton, was used as ordinate.

In calculating curves from data taken on reversing cold-strip mills, where the trailing reel is producing electrical energy instead of absorbing it, this amount of energy is subtracted from the total input to the main roll and winding-reel motors. The winding-up reel, of course, is absorbing power and its input is added to the input to the main-roll motor input.

pounds pull per inch of width as ordinate against the total thickness as abscissa. An example of how to determine the horsepower for a particular pass will serve to illustrate clearly how the curves are constructed and used.

Assume, for example, that the metal is 30 in. wide and has been previously cold-rolled from 0.073 to 0.040 in. before it reaches the particular pass to be considered. Assume also that this particular pass or stand will reduce the strip from 0.040 to 0.030 in. at 400 ft. per min. delivery speed. Referring then to Curve A, Fig. 1, the total pull from 0.073 to 0.040 in. is 2810 lb. per inch width. From 0.073 to 0.030 in., it is 3920 lb. per inch of width. Therefore, the net pull required by 30-in.-wide material for this particular pass is:

$$30 (3920 - 2810) = 33,300 \text{ lb. pull}$$

passes, even though they are hypothetical passes and do not correspond exactly to the real passes. It is for these conditions that the above relationship is correct. In other words, the relationship is correct for individual increments and not for total.

Comparison of Curves

In Fig. 7 all of the curves are plotted as a family and clearly indicate the effect of different entering thicknesses. The thicker the entering piece, the steeper is the slope of the particular curve. This is a result, of course, of the hardening effect of cold-rolling.

Plotting all of the curves together on a single sheet, as a family, with the same ordinate and abscissa, makes a convenient method of checking the accuracy of any particular curve. Should any particular curve not con-

Concluded on Page 69

Investigates

Performance of Bearing Metals

A NEW method of investigating the performance of bearing metals has been evolved by J. R. Connelly, Lehigh University, Bethlehem, Pa. He discussed it at some length in a paper presented to the American Society of Mechanical Engineers, and from the paper the following has been taken:

The essential elements of the new test are a specimen of bearing metal with one side machined to a plane surface and a rotating steel cylinder. A constant force holds the specimen of bearing metal with its plane side tangent to the cylinder.

As the cylinder rotates, a depression is worn in the specimen of bearing metal. With a constant force holding the surfaces together, this increase in contact area gives a decrease in unit pressure. The test continues until there is no measurable increase in the depth of the depression. The cylinder rotates in a bath of lubricant.

The characteristics of the new test are:

1. The conditions existing in an actual bearing are reproduced as to lubrication, metals used, physical proportions, and wear. Wear in the presence of a lubricant results from high unit pressures.
2. The validity of the test data is independent of any assumption that data on abrasion is directly convertible to data on wear.
3. The feature of varying area of contact gives rate of wear for a wide range of unit pressures. An investigator using a test involving a constant area of speci-

men must necessarily make a great number of runs each at a different unit pressure.

4. The data obtained are directly usable for design purposes.

Analysis of a Machine Bearing

No matter how careful and painstaking the manufacture and assembly of a sliding contact bearing, it is practically impossible to have the mating surfaces absolutely aligned so that the load shall be evenly distributed over the surface intended to carry it. As a result, the actual surface in contact



A BLOCK of bearing metal is held by a constant force against a steel cylinder. As the cylinder revolves it wears into the bearing metal so that the area in contact and the unit pressure vary throughout the test. The method eliminates the necessity of testing innumerable specimens each for a different unit pressure. Wear takes place until equilibrium is established between the unit bearing pressure and the film of the lubricant. The Connelly apparatus and method provide for making a comparison of various metals used with a given lubricant and a comparison of various lubricants used with a given metal.

is reduced so that high unit pressures exist at points on the surface.

The first stage in the life of a sliding contact bearing is a period during which the surface in contact wears away until a "fit" is obtained. That is, as the bearing metal wears, the surface in contact gradually increases. This permits the load to spread itself over a greater area with a reduction in unit pressure. Wear continues until the maximum unit pressure existing in the bearing is insufficient to rupture the oil film. Such a condition completes the first stage. The extent of the bearing area in actual contact and the corresponding unit pressure when wear ceases, vary with the temperature and properties of the lubricant.

The second stage in the life of a sliding contact bearing consists of relative motion between surfaces separated by a lubricant. If this condition persists indefinitely, the only necessary quality of a bearing metal would be an ability to attract and retain lubricant on its surface. However, all bearings stop occasionally with consequent disturbance of lubrication equilibrium. Restarting results in wear.

Present Design of Bearings

In this paper the term bearing metal shall apply to the part on which the major portion of wear is to take place.

At present the design of bearings considers (1) mechanical strength of both journal and bearing, (2) heat dissipation, and (3) wear.

An ideal bearing metal should (1) have sufficient mechanical strength to support the load without plastic de-

formation, (2) retain a lubricant on its surface, and (3) have a maximum resistance to wear without causing undue wear on the mating metal.

At present, the consideration of wear is met by using a combination of unit working pressure and lubricant that past experience has shown will not give excessive wear during continuous operation. Very little information is extant on rate of wear during running in or restarting.

The new method will furnish data that will make possible a far more

ment of the friction force will not be a disturbing element; (2) the fulcrum consists of hardened steel points working in conical recesses so that the lever will not move in any way except about its own fulcrum. A counterbalance prevents any pressure between the test pieces due to the weight of any of the parts. A calibrated weight is hung from steel points on the lever to supply the definite known pressure between the cylinder and the block of bearing metal.

1750 r.p.m. ball bearing motor. The other end of the steel rod constitutes the test cylinder or test journal proper. This test journal is prepared by grinding it to as near a true right circular cylinder as is easily possible. The maximum variation of diameter at any cross-section is of the order of 0.0001 in.

To lubricate the test pieces a small metal box is placed so that the test journal runs through a felt packing into the box which is kept full of oil to a constant level. A gear pump recirculates the oil continually.

The temperature of the lubricant supplied to the bearing is taken by means of a copper-constantan thermocouple installed in a glass tube filled with oil. The tube rests in the box of lubricant. This glass tube electrically insulates the thermocouple from its metal surroundings.

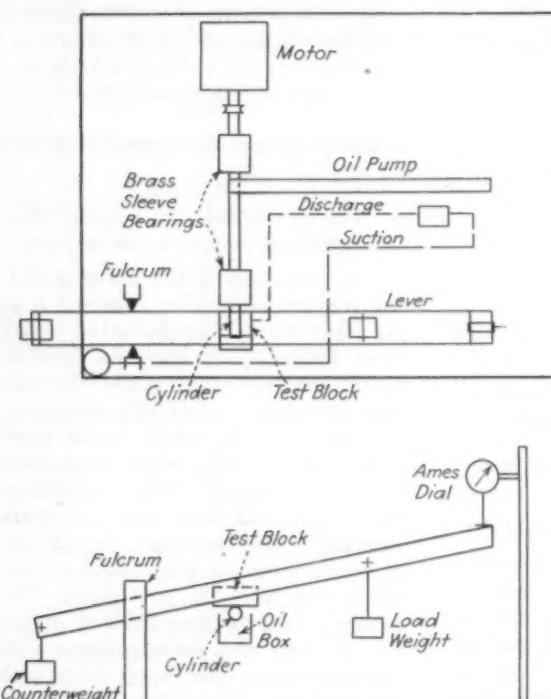
The temperature of the block of bearing metal is taken through a copper and a constantan wire each peened into opposite faces of the block near the test surface. In order to reduce to a minimum the dissipation of heat from the block, asbestos paper is used between the block and its support.

The r.p.m. of the cylinder is taken by measuring the slip of the motor using a mark on the shaft and a neon lamp.

An Illustrative Test

A specimen of bearing metal is clamped in the holder described and adjusted tangent to the test journal with the aid of Prussian blue. It is not absolutely necessary that the bearing metal be exactly tangent to the cylinder, provided it is approximately so. The projected area is measured at the completion of a run and if the bearing metal were not quite tangent at the beginning the projected area of the worn volume would be a trapezoid rather than a rectangle.

Time is recorded as the machine is started. At present no attempt is made to read the lever deflection at starting. When the load weight is first applied, conditions are very unstable probably due to a slight amount of plastic deformation. About 30 sec. after starting, it is possible to obtain readings of lever deflections and they are then taken throughout the test. To furnish an idea of the length of a run it may be stated that the total time varies from two weeks to a month of continuous operation. During this period a point on the surface of the cylinder travels a distance of the order of 3,000,000 ft. After the test is complete the lever deflection readings are corrected to agree



SCHEME of testing apparatus for determining wear of a bearing metal operated under service conditions at constant pressure.

accurate consideration of wear. This will be accomplished by giving values of ultimate bearing pressure for a lubricated bearing, and relative rate of wear during wearing in and restarting.

Experimental Testing Machine

The mechanism for testing consists essentially of a rigid lever supported at the fulcrum and carrying the test block which in turn bears on the cylinder as shown in the accompanying sketch. This arrangement permits motion of the block of bearing metal only in a circle about the fulcrum as a center. The angle moved through is so small that for all practical purposes the block of bearing metal may be said to have straight line motion.

In designing the lever several limitations were set up: (1) the fulcrum of the lever shall be placed in a horizontal plane tangent to the top of the test cylinder so that the mo-

The block of bearing metal is clamped securely to a holder plate which is in turn bolted to the lever. Adjustment between the holder plate and the lever is possible in any direction.

Various methods have been used to measure the movement of the lever as wear progressed. The lever serves the further purpose of magnifying the depth of worn volume for accuracy in reading. A 1/10,000th in. Ames dial gage is valuable for studying the early states when the lever movement is relatively fast. For a complete test a 1/10,000-in. micrometer screw in conjunction with a telephone head set or a grid glow tube is a desirable combination.

The cylinder consists of a length of 1/2-in. steel rod rigidly mounted through two brass sleeve bearings to the same heavy cast iron base used for the lever fulcrum support. One end of the steel rod is direct connected through a flexible coupling to a 1/4-hp.

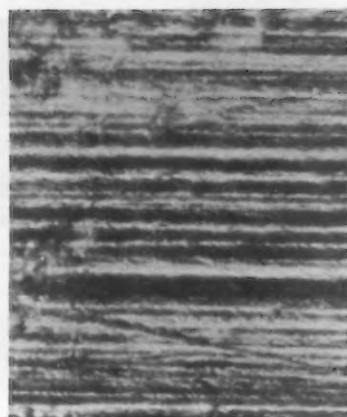
with the projected area of worn volume obtained by measurement. Other readings taken are r.p.m. of cylinder, temperature of bearing metal, temperature of lubricant, temperatures of the room and power consumed by the driving motor.

The curves showing relation between the amount of travel and unit pressure and total volume worn away are here reproduced. The general shape of the curves show quite definitely that a discontinuity occurs at about 800,000 ft. of travel. Beyond this point wear takes place at a greatly reduced rate. After about 2,000,000 ft. of travel wear seems to cease altogether even though the run was continued to about 2,700,000 ft. of travel. The ready location of these different phases of wear is an advantage of this type of test.

The point at which wear ceases is simply determined by the pressure curve, dropping to a value where an oil film may be obtained. This value may appropriately be called the ultimate bearing pressure and used for design with a factor of safety.

The pressure at which an oil film may be maintained seems to be affected by a number of variables among which are (1) the lubricant, (2) the temperature of the lubricant, and (3) the ratio L/d. The bearing metal is subject to at least two known variations, (1) that of composition, and (2) different sizes of crystals depending on conditions of casting and cooling.

A photomicrograph of the metal surface after the test was completed is included to show definitely that the crystal structure is that of a bearing



AS the bearing metal wears away, pressure per unit of bearing surface drops until wear practically ceases.

in service. It is anticipated that the wear qualities of a metal will be influenced by the size and distribution of the supporting crystal.

General Use of Test

There are several problems connected with the use of bearing metals concerning which much needed information may be obtained by the test described in this paper:

- A. The allowable working pressure will be determined by the ultimate bearing pressure in conjunction with a factor of safety.
- B. The amount of wear during starting of an actual bearing will be indicated by the relative position of the rate of wear curve.
- C. Inter-relation of the variables, for example, the optimum L/d ratio may vary with both the lubricant and the bearing metal.

The intended type of service for a given bearing will determine the rela-



tive emphasis to be placed on items A and B during design.

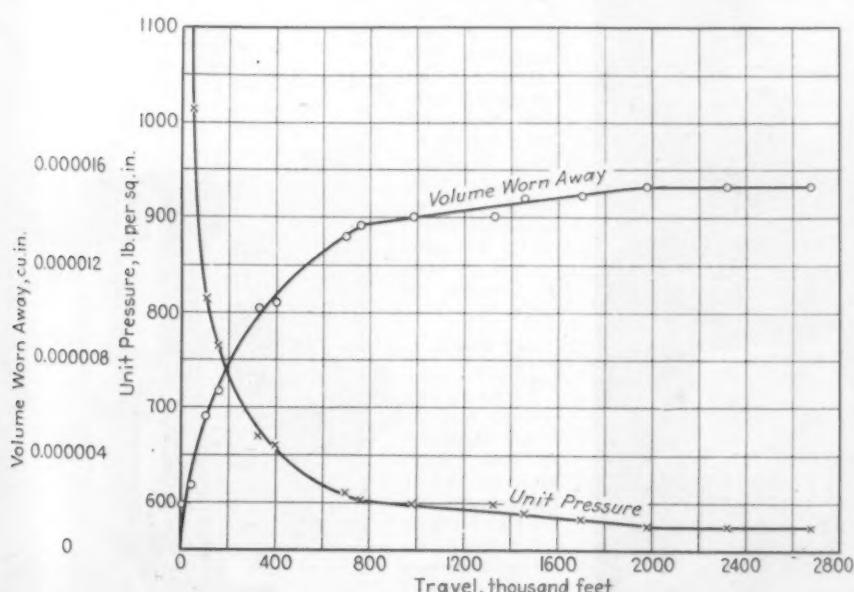
In order to obtain the data on which to base the above selections each one of the variables must be investigated separately.

The field of investigation into the performance of bearing metals, to which this method may particularly be applied, is broadly divided into three phases:

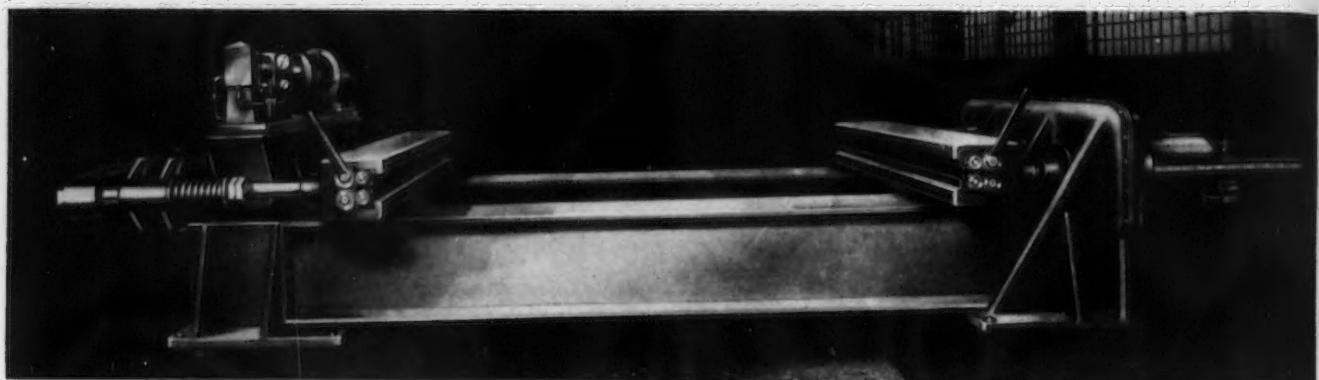
1. Using a certain bearing metal as a standard of comparison the wear-reducing properties of various lubricants may be determined, together with the effect of variation in viscosity of a given lubricant.
2. Using a certain lubricant as a standard of comparison the effect of composition, crystal size, and physical proportions may be investigated.
3. Using the representative lubricants and the representative metals the interrelation of the variables may be determined.

Electrolytic pickling of high-speed steel to get a surface free from oxide and non-metallic materials generally was found by Raymond R. Rogers, Department of Chemical Engineering, Columbia University, New York, to produce a much cleaner metallic surface than is produced by any of the ordinary acid pickles, including hydrofluoric acid. Also he reported the process to require less time and to be convenient to work with. He described his investigations in a paper contributed to the Electrochemical Society.

Size preparation of iron ores as offering a promising field for improving blast-furnace performance has been emphasized at times by T. L. Joseph, supervising engineer, United States Bureau of Mines at Minneapolis. The procedure involves the sintering of fine ores and concentrates and the proper size reduction of hard, coarse ores. The investigations made under his direction are covered in a report now available from the Bureau, being designated as R. I. 3240.



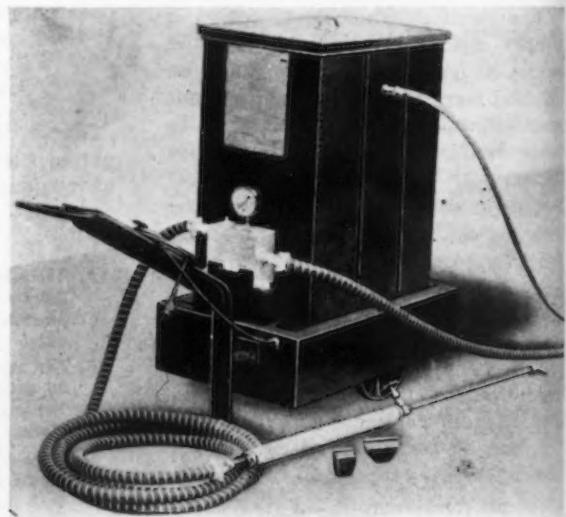
PHOTOMICROGRAPHS at 100 diameters of the metal surface (before testing at the left and after testing at the right) show that the crystal structure is that of a bearing in service.



THE stretching equipment of this modernized sheet stretcher, developed by the Lewis Foundry & Machine Co., Coraopolis, Pa., a subsidiary of the Blaw-Knox Co., is a single unit mounted on top of the hydraulically-operated cylinders. The oil hydraulic pump is direct motor driven. The machine is self-contained and can be moved to any part of a plant. The head is entirely inclosed, with the gears running in oil, and is arranged so that it can be adjusted easily for long and short sheets. The machine can be made in length and width to suit requirements.

AT RIGHT

FIRELESS vapor - spray cleaning unit for cleaning factory machinery, motors and interior and exterior walls. It uses plant steam, is compact and portable, and the amount of compound and moisture can be varied to give a heavy spray or light mist.

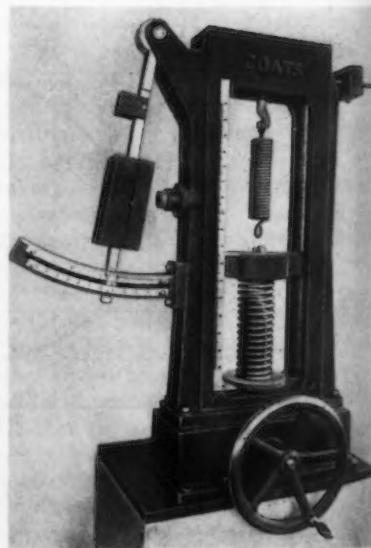
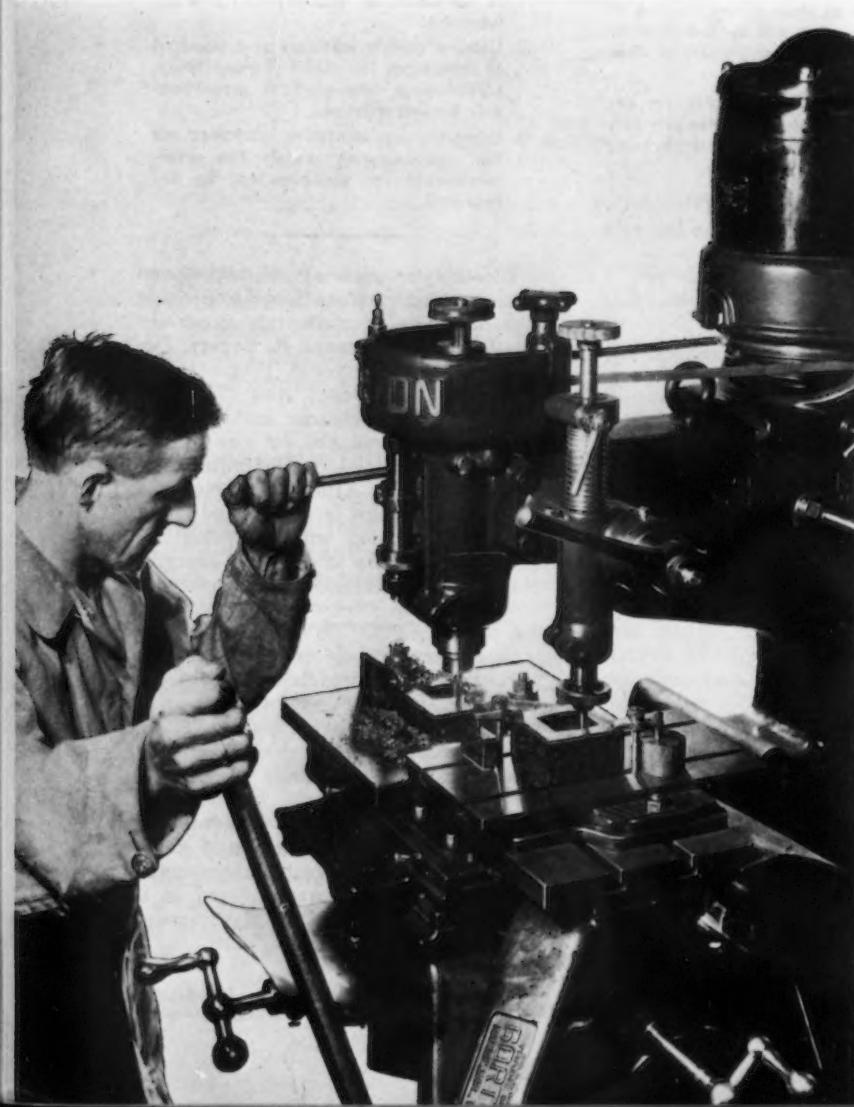


AT LEFT

SMALL dies and molds of irregular shape are duplicated accurately by this equipment, consisting of a Certon vertical miller with tracing arm and a special table. Duplicator head and table can be detached quickly to permit use of the miller for ordinary work, as described on page 34.

AT RIGHT

HEAVY compression springs may be tested rapidly on this new pendulum indicating Elasticometer. A detachable weight on the pendulum permits accurate tests of weak as well as strong springs, and two load ranges are indicated on the arc. Further details are given on page 34.



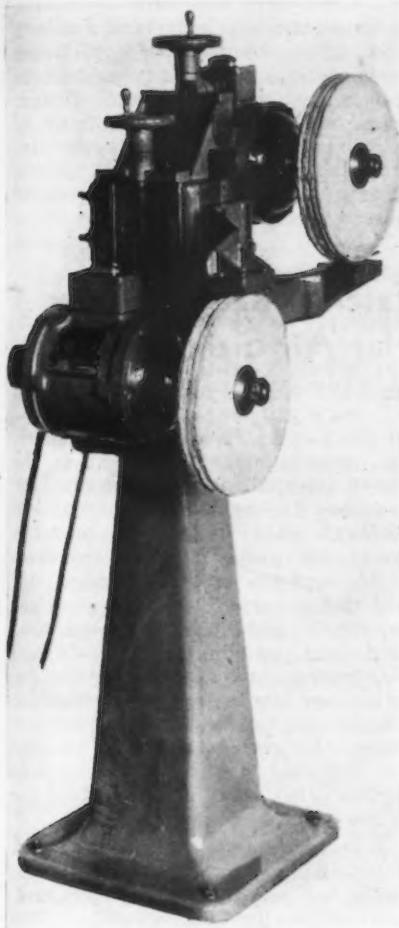
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AT RIGHT

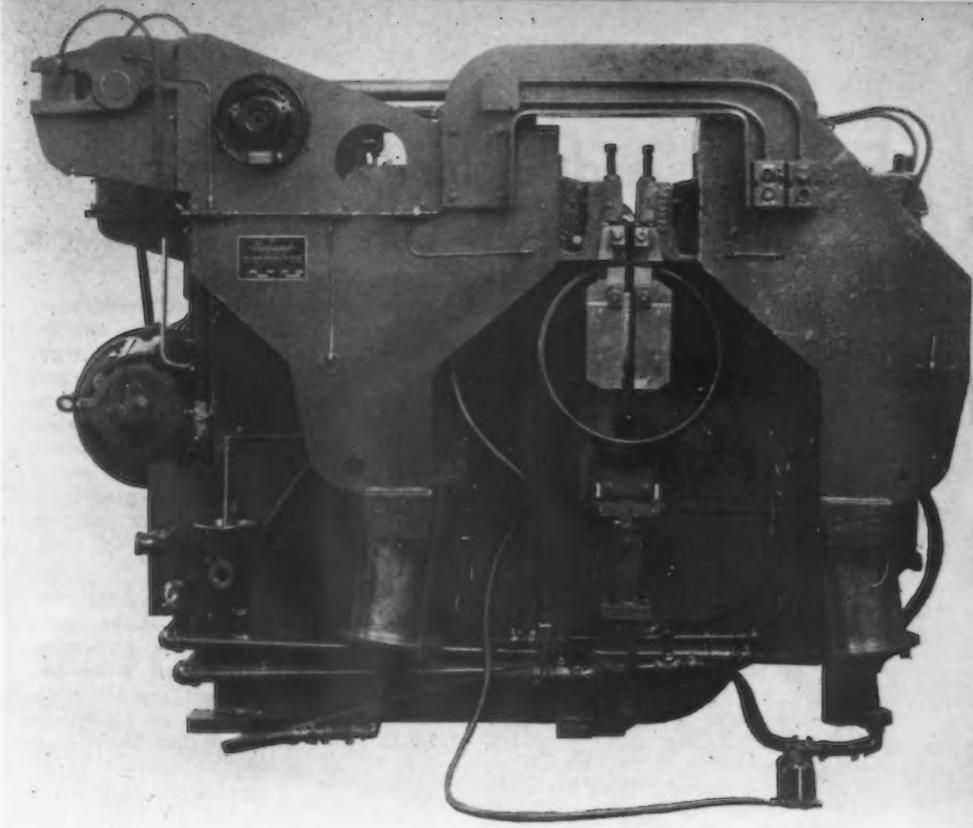
THIS heavy overhung-type Federal rim welder, which welds rims at the rate of 250 to 600 an hour, is unusually rugged and includes a number of refinements, such as hardened and ground steel bushings and pins, and thorough protection of parts from flash. Adjustment for bringing the movable and stationary dies to exact height is a major improvement (see description on page 35 eliminating the necessity of shimming the dies).



BOTH sides of steel strip are cleaned and polished in one operation on this machine, which is built by the Standard Electrical Tool Co., Cincinnati, for use in connection with electric hardening and tempering furnaces. One machine, having buffing wheels with emery glued to the face, is used for cleaning the scale and another for polishing the strip. Vertical adjustment is provided to compensate for wheel wear. Wire of all sizes can also be cleaned and polished.

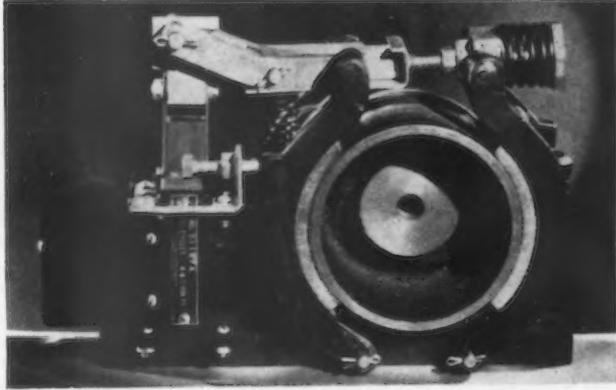


WITH the hand or foot-operated collet chuck this speed lathe, described on page 35 may be used for production lapping, finishing and polishing.



AT RIGHT

SOLENOID-OPERATED brakes of this design for machine tools, conveyors, small hoists and similar equipment, include torque ratings ranging from 3 to 75 lb.-ft. The brake wheel is made relatively large to assure low unit pressure on the brake lining, as pointed out in the description on page 35.



BELOW

SMOOTH operation and an air sizing device that causes the machine to finish raceways to limits of less than 0.0005 in. are features of the new Landis 5-in. hydraulic external race grinder pictured below. Capacity and other details are given on page 34.



Small Dies and Molds Duplicated Accurately by New Device

FOR reproducing small dies such as fused in die casting and in drop forging, and molds used in the rubber, glass and plastics industries, the George Gorton Machine Co., Racine, Wis., is offering a new line of precision Duplicating machines. These machines, illustrated on page 32, are manually operated. They consist of Gorton vertical millers equipped with a tracing arm at the right of the cutter spindle, and have a special table mounted on top of the standard milling machine table and running on special compound ball-bearing slides.

With his left hand the operator controls the movement of both milling cutter and tracer spindles, raising or lowering them as the tracer point follows the contours of the master or die to be reproduced. With his right hand he moves the Duplicator table in any direction, causing the cutter to mill out the die as the tracer follows the shape of the master, which may be made of brass, Bakelite, fusible alloy or other material. The original master can be reproduced within limits of 0.001 in. or closer in small areas.

The master table has built-in micrometers for accurately shifting the die during reproduction, should slight changes in position of various sections be desirable on the new die. Similarly, portions of several originals may be combined in a new die, or sections left off entirely. Holes for ejector pins, etc., can be located from the old die and spotted for drilling, thus eliminating a jig-boring operation.

Designed primarily for small, accurate work of irregular shape, these Duplicators will cut deep, serpentine grooves, sharp shoulders, steep angles and difficult shapes, including lettering of trademarks. Spindle speeds up to 12,000 r.p.m. permit use of cutters of 25 or 30 thousandths in diameter. For roughing out of dies the Duplicator table can be locked and movement obtained with the milling machine table screws. For this work cutters with shank diameter up to $\frac{1}{2}$ in. can be used. Duplicator head and table can be detached in 5 min. to permit use of the milling machine for ordinary work.

45 in. high and 52 in. long, including handle, it is compact and conveniently portable. It differs from the company's previous model chiefly in using plant steam instead of producing its vapor by means of an oil-fired generator. All essentials for cleaning, namely, heat, water pressure and cleaning compounds, are uniformly combined into a powerful vapor spray that emerges from the nozzle at high velocity. The unit, illustrated on page 32, consists of a water or solution tank containing an automatic float valve and a rotary pump direct connected to a fractional horsepower motor that takes current from a light socket. Amount of compound and moisture content may be varied by means of a manually adjustable mechanism to give anything from a heavy cutting spray to a light cleaning mist.

External Race Grinder Has Air Sizing Device

A FIVE-INCH hydraulic external race grinder has been designed by the Landis Tool Co., Waynesboro, Pa., as companion equipment to the $3\frac{1}{2}$ -in. internal race grinding machine described at length in THE IRON AGE of March 15. For the most part the design and proportions are the same as those of the internal race grinder and the external machine also has capacity to grind all the smaller sizes up to and including the 218, 316 and 414 groups. Although ordinarily for single-row races only, the machine may be used for double-row and thrust races. Larger sizes can be handled by removing the sizing device and certain other parts and operating the grinder as a hand-operated unit.

A feature emphasized is the Landis-Solex sizing device which is said to cause the machine to produce raceways within limits of less than 0.0005 in. Operation of this device is the same in principle on both the internal and external machines, but on the latter a caliper frame mounted on a swinging arm is used instead of the diamond-tipped finger. An air pump driven by the main motor furnishes air pressure for the sizing device of both machines.

Chatter-free finish is attributed to use of hydraulic power and to elimination of vibration between grinding wheel and work by mounting the 3-hp. wheel and pump drive motor and the $\frac{3}{4}$ -hp. work-drive motor low on the bed. No one type of work-holding chuck is standard. The machine shown on page 33 is equipped with a magnetic chuck, but in some cases the ring is held on a short arbor by means of a C washer. Other chucking means may also be employed. As the grinding wheel is larger than that of the internal race grinder, wheel spindle and bearings are more generously proportioned. Floor space of 45 x 60 in. is required; net weight, without electrical equipment, is 3200 lb.

Heavy-Spring Tester of Pendulum Indicating Type

FOR testing heavy springs, the Coats Machine Tool Co., 110 West Forty-fifth Street, New York, is offering a new pendulum indicating Elasticometer designated as the type DN. Unlike the type DS machine, previously described, there is no upper compression plate. A screw-operated cross-head, guided within the frame of the machine, bears down on compression springs, compressing them against a lower compression plate suspended from a single beam weigher scale that is located in the upper housing of the machine.

The lower compression plate is guided on each side in steel balls to prevent lateral forces set up in a spring under load from interfering with the free play of the scale. Rubber bumpers protect the weigher scale against sudden jerks or knocks. Travel of the crosshead is actuated by a handwheel through two screws. The crosshead is bored to admit arbors or pilots up to $4\frac{1}{4}$ in. in diameter for supporting long compression springs. For testing extension springs a tension hook may be screwed into the crosshead.

The weigher scale consists of a single beam, from which are suspended the lower compression plate and upper tension hooks. A steel ribbon transmits the motion of the beam to the indicating pendulum. A detachable weight on the pendulum makes it possible to weigh weak

springs with the same accuracy as strong springs. Consequently the machine has two load ranges, as indicated by the upper and lower scales of the arc. A vertical length scale is attached to the lower compression plate and follows the path of this plate or that of the upper tension hook. Readings of the length index pointer attached to the crosshead always measure the distance between compression plates or tension hooks, independent of form changes of the frame caused by the force of springs under load.

Four sizes of the DN Elasticometer, pictured on page 32, are made; the lower weigher scale of the smallest ranges from 0 to 650 lb. and of the largest from 0 to 6000 lb. Area of baseplate ranges from 13 x 25 in. to 14 x 25 in.

Fireless Vapor-Spray Cleaning Unit

A FIRELESS model of its Hypersure Jenny vapor-spray cleaning unit has been made available by the Homestead Valve Mfg. Co., Coraopolis, Pa., for cleaning machinery, motors, skylights and exterior and interior walls of plants having process or other steam available. It operates on pressures ranging from 50 to 250 lb., and, measuring only 20 in. wide,

Overhung Rim Welder Features Rugged Construction and Improved Adjustment

LONG, heavy-duty service with minimum of adjustment and replacement and maximum convenience of operation were basic objectives in developing the improved overhung rim welder recently brought out by the Federal Machine & Welder Co., Warren, Ohio. Capacity of the machine, which is pictured on page 33, is for material up to 10 in. wide and 3/16 in. thick, and rims of 15 in. minimum diameter. Production ranges from 250 to 600 rims an hour, depending on the size and shape of rim and the arrangement for getting the work to and from the welder.

A heavy arc-welded structural steel foundation plate supports the transformer, platen and other operating parts. Main electrodes or die supports are projected forward from the face of the transformer so that rims may be slipped directly over them and hung down in front of the machine, an arrangement that eliminates having to place the rims directly on top of the welder and reaching over to clamp and unclamp. Main electrodes and supports are made of substantial gun metal castings and are drilled and supplied with water passages to maintain an even, low temperature. A set of electrodes can be removed by means of a single wrench, and it is stated that a set of dies can be removed and replaced in less than 10 min.

The movable electrode, located at the right-hand side, is carried by a gun metal swinging arm. It is hinged on a hardened steel pin designed with an eccentric, rotation of which by means of a wrench will give vertical adjustment of $\frac{1}{4}$ in. This permits the operator to bring the movable and stationary dies to an exact height, which is emphasized as a decided improvement, as it eliminates the necessity for shimming the dies. This feature is patented. It is stated that the practice of inserting a piece of copper, brass or steel underneath the dies decreases materially the efficiency of a welding machine and tends to destroy both dies and die supports.

Clamping is by means of air cylinders which are located well out of the way of the flash. The supporting pins that take the pressure during welding are yoked over the top of the movable arm to maintain substantial and even support for the pins and assure even wear of the bearings. Clamp arms are made of steel castings, and both right and left-hand clamps are designed so that the movable supporting pin operates in a hardened steel or bronze bushing which can be removed and replaced when worn. The clamp contacts proper, which come on the outside of the rim, are designed

to receive a hardened steel facing. A separate holding device is provided for this contact part; it can be adjusted slightly to permit tipping the clamping die forward or backward to maintain pressure on the front or back of the die as may be required.

A new cam-operated push-up actuated by a 5-hp. motor is provided. It is arranged so that pressure applied

during the completion of the weld comes directly on the clamping jaws and weld, instead of being transmitted to the work through the frame of the machine.

The machine is equipped with a Federal flashproof 750-kva. transformer. A separate auto coil is furnished; it is arranged so that the voltage can be varied from 10 to 5 volts in eight equal steps, to permit handling light and heavy material. The machine measures 62 in. front to back, and 84 in. right to left; the height to the top of the dies is 34 in. The weight of the complete equipment is 32,000 lb.

Speed Lathe Has Chuck Operated by Hand or Foot

TO permit production lapping, finishing or polishing operations on small parts, the Schauer Machine Co., Cincinnati, is supplying its Ideal speed lathe with hand or foot-operated collet chuck. The chuck has capacity for round stock up to 1 in. in diameter.

As shown in the illustration at the lower left of page 33, this lathe is of simple design. It is equipped with a two-speed, totally-inclosed and dust-proof $\frac{1}{2}$ -hp. motor, automatic brake and ball bearings. The motor provides speeds of 1350 and 2700 on a.c., selection of the high and low speed being by means of a switch in the motor base. Operating current is cut in by a slight backward push on the rear vertical lever and is cut off and the brake is automatically applied by forward movement of the same lever. Stopping of the motor is effected smoothly, and in 2 sec. or less when running at high speed.

The collet chuck can be operated with motor at rest or running. Wheel or step chucks can be furnished for use in polishing or finishing of rings, such as ball bearing races and spinning rings.

Small Solenoid-Operated Brakes

THE line of small alternating and direct current solenoid-operated brakes announced recently by Cutler-Hammer, Inc., Milwaukee, includes three new sizes with torque ratings ranging from 3 to 75 lb.-ft. The brake wheel is relatively large, allowing low total brake shoe pressures which, distributed over the large brake lining area, is emphasized as resulting in low unit pressure on the lining and, therefore, long, even wear of the friction surfaces. The low shoe pressure also results in low stresses on all pins and pivot points, assuring longer wear for these parts, and allows the use of a small operating solenoid which requires less current.

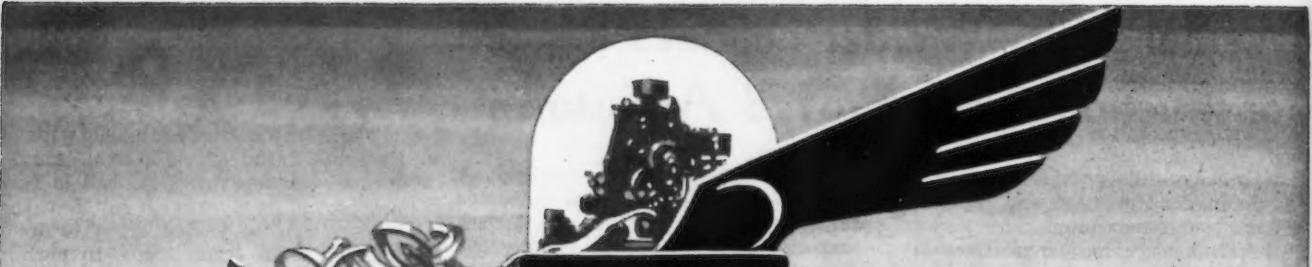
The a.c. and d.c. brakes are inter-

changeable, so that standard mounting holes can be provided and either of the brakes applied as needed. The brake shoes have a molded brake lining and provide 180 deg. braking service. These new brakes, one size of which is pictured on page 33, are for machine tools, conveyors and other small equipment requiring quick and positive stopping.

Elimination of Sulphur From Pig Iron

THE elimination of sulphur from pig iron has been studied at some length by T. L. Joseph, supervising engineer, United States Bureau of Mines, Minneapolis, and W. F. Holbrook, assistant chemical engineer, also at the Minneapolis station. A review of these desulphurization studies has been made a part of report 3240 issued by the Bureau of Mines.

Laboratory tests show that metal containing several tenths of 1 per cent of sulphur can be desulphurized by allowing the metal to cool, provided the residual manganese approximates 2 per cent. A small amount of manganese will be lost as manganese sulphide. The product of the percentage of manganese multiplied by the percentage of sulphur approaches a constant value at a given temperature. Normal variations in silicon and manganese have little effect on the constancy of this product. From the data obtained the sulphur content of the metal between 1250 and 1500 deg. C. can be predicted for any manganese content. The effect of temperature is more pronounced above 1350 deg. C., but a change of 25 deg. has a significant effect at temperatures little above the melting point of cast iron. Mechanical contamination of cast metal can be prevented by removing the solid layer of manganese sulphide and kish and skimming the metal during pouring.



THE NEWS OF THE WEEK

Sharp Decline in Flat Rolled Steel Production in July

SALES, production and shipments declined sharply in July, according to the report of the National Association of Flat Rolled Steel Manufacturers, Pittsburgh.

In this survey, which is based on figures covering a monthly capacity of 325,000 net tons, or approximately 59 per cent of the country's total capacity of 550,000 net tons, makers reported sales of 72,517 net tons in July, compared with 114,855 tons in June; production of 85,286 tons against 199,438 tons, and shipments of 85,442 tons, contrasted with 301,832 tons.

Unfilled tonnage on Aug. 1 totaled

69,472 tons, or 21.4 per cent of capacity, compared with 74,392 tons, or 22.9 per cent of capacity on July 1.

The July report with comparisons of the two preceding months, in net tons, follows:

	July	June	May
Sales	72,517	114,855	246,315
Production	85,286	199,438	256,537
Shipments	85,442	301,832	240,730
Unfilled orders	69,472	74,392	257,845
Unshipped orders	39,058	50,284	88,796
Unsold stocks	71,362	56,666	48,714
Capacity per month.	550,000	550,000	550,000
Percentage reporting	59.0	59.0	59.0

Percentages, Based on Capacity

Sales	22.3	35.4	75.8
Production	26.2	61.4	79.0
Shipments	26.3	92.9	74.1
Unfilled orders	21.4	22.9	79.4
Unshipped orders	12.0	15.5	27.3
Unsold stocks	22.0	17.4	15.0

Steel Warehouse Association Will Operate Under Wholesaling Code

THE American Steel Warehouse Association has received formal notification that the NRA has placed the steel warehouse trade under the Code of Fair Competition for the Wholesaling or Distributing Trade as approved by President Roosevelt on Jan. 12, 1934. All the provisions of the code will be in force for the steel warehouse trade on Sept. 1, 1934. The code provides for a 40-hr. week with no averaging of hours. Overtime is permitted at a rate one and one-third times the regular hourly rate of the employee. There are no provisions made for the filing of prices, but the warehouse association is permitted to set up a sub-code with a separate divisional code authority. However, no sub-code is under consideration at the present time.

Originally the Steel Warehouse Association had filed a code patterned after the steel code. It contained labor

provisions similar to those of the steel code, commercial provisions were included, and prices were to be filed according to the steel car basing points plus suitable freight charges. For various reasons, both the warehouse association and the NRA decided that it would be more suitable to operate under a code already established than to go to the additional expense and trouble of setting up another code.

Fisher Body to Erect Addition at Cleveland

FISHER BODY CORPN., General Motors Building, Detroit, will soon begin construction of the superstructure for one-story addition, 200 x 400 ft., to its plant on East 140th Street, Cleveland, for a new press department and other steel body service.

The cost of the addition with equipment will exceed \$100,000. This will be part of program being arranged by company for expansion and improvements in branch plants in different parts of country, including a new plant at Baltimore for body production for Chevrolet and Pontiac automobiles.

Kohler to Hold Out For Open Shop

WALTER J. KOHLER has declared definitely that the Kohler Mfg. Co. will not permit the American Federation of Labor to dominate its labor at the Kohler Wisconsin Plant which has been closed as a result of a strike. Conferences with members of the Chicago regional labor board and a union committee, a statement declares, had made clear that the purpose of the union is to dominate the company and to be recognized as spokesmen for all the workers whether they choose to be so represented or not.

"Our several meetings with members of the Chicago regional labor board and a committee of the union have made one thing clear," said Mr. Kohler. "This is that the major issue involved is, not whether employees of Kohler company may be represented by representatives of their own choosing, but whether the American Federation of Labor union is to be recognized as the representative of all Kohler employees regardless of their wishes.

"Sixty-five per cent higher minimum wages than the minimum described by the code under which the company is operating as well as 25 per cent shorter hours were included among the union demands in order to lure employees into striking in the hope of getting more money for less work, to make some semblance of a case against the company, and to confuse the public as to the real issue involved. But when we tried to reach a settlement the union committee itself proposed a postponement of its demands for higher wages and shorter hours and revealed that its one major purpose is absolute

domination of the company and all the employees.

"Our answer to the union committee is that the National Industrial Recovery Act assures it the right to represent and negotiate for employees who wish to be represented by it. That has been our position consistently. We have met with representatives of the union every time they have requested a meeting. They have asked for one meeting this year, which was held July 6. Following this meeting, we stated in writing that we would continue to meet with them, but their only reply was a strike accompanied by illegal picketing, intimidation, violence and a mob attack upon a plant that was shut down and had made no effort to go into production since the first day of the strike.

"But our answer is further that the same law that gives the American Federation of Labor the right to represent its members assures other employees the right to representatives of their own choosing and guarantees to each individual action if he chooses to exercise it.

"Kohler company has lived up to the National Industrial Recovery Act both in letter and in spirit. It has scrupulously observed the provisions of the several codes under which its business operates and in each of which section 7-A is incorporated. It has no intention of doing otherwise.

"More than 1500 employees have signed a petition stating they wish to return to work under conditions prevailing before the strike and asking public authorities for protection to enable them to do so. For Kohler company to recognize the American Federation of Labor as the sole representative of the employees would be to deprive these 1500 employees of their legal right to representatives of their own choosing. It would be on our part a violation of the law, a betrayal of those employees and an act of moral cowardice."

"Kohler company will not recognize the American Federation of Labor or any other organization as the representative of employees who do not wish to be represented by it, until, or unless, the court of last resort tells us that we are mistaken in our reading of the law."

Macwhyte Co. Appoints Duluth Distributer

ZALK-JOSEPHS CO., 300 East Michigan Street, Duluth, Minn., dealer in mine, mill and railway supplies, has been appointed a distributor for the Macwhyte Co. In its Duluth warehouse Zalk-Josephs will stock a complete line of Macwhyte internally lubricated wire rope, including Monarch Whyte Strand.

British Iron and Steel Feels Seasonal Quietness

LONDON, ENGLAND, Aug. 21 (By Cable).—The seasonal quietness is reflected in demand for British pig iron, but the situation is healthy with regard to non-excessive stocks. A slight improvement has been noted in overseas buying.

The order books of steel producers are in good shape, although mills rolling shipbuilding material and sheets need additional orders. Makers of structural steel and railway material are busy.

British producers have secured important South African railway contracts, including 20 locomotives and 50 coaches.

Total exports of pig iron for July from the United Kingdom amounted to 8627 tons, of which 50 tons were shipped to the United States. Total exports of both iron and steel aggregated 197,126 gross tons.

Domestic demand for tin plate is dull, but export business is satisfactory and backlog are in good shape. Sales are now permitted for delivery up to November. For later delivery permission of the International Committee is necessary and an additional minimum extra of 3d. is required. Final arrangements with merchants

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese,		
export	£9	
Billets, open-hearth.	£5 10s.	to £5 15s.
Tin plate, per base box	18s.	to 18s. 3d.
Steel bars, open-hearth	£7 17½s.	
Beams, open-hearth.	£7 7½s.	
Channels, open-hearth	£7 12½s.	
Angles, open-hearth	£7 7½s.	
Black sheets, No. 24 gage.....	£9 5s.	
Galvanized sheets, No. 24 gage.....	£11 5s.	

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 12.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

Billets, Thomas...	£2 7s.
Wire rods, No. 5	
B.W.G.	£4 10s.
Steel bars, merchant	
£3 5s.	
Sheet bars.....	£2 8s.
Plates, $\frac{1}{4}$ in. and up	£4
Plates, $\frac{3}{16}$ in.	
and 5 mm.....	£4 2s. 6d.
Sheets, $\frac{1}{8}$ in.....	£4 7s. 6d.
Beams, Thomas...	£3 2s. 6d.
Angles (Basic)...	£3 2s. 6d.
Hoops and strip base	£4 2s. 6d.
Wire, plain, No. 8	£5 7s. 6d.
Wire nails.....	£5 15s.
Wire, barbed, 4-pt.	
No. 10 B.W.G..	£8 15s.

are apparently not yet concluded. Italy has joined the international agreement only as regards tonnage and may be allowed to sell at fixed differentials under the general figure because of the inferior quality of the product. Foreign buyers are not pleased with the agreement.

Quietness of Continental iron and steel is accentuated by the Assumption festival. International Raw Steel Cartel has raised prices slightly for certain destinations, including the Pacific coast of North America. General modifications in the price structure are unlikely, however, before the middle of September.

The small Nederlandsche Stalfabrieken J.M. de Munick has joined the international sales office for semi-finished steel. The Cockerill shipyard of Belgium is shutting down because of lack of orders. This involves the dismissal of 3000 employees.

British Iron and Steel Production in July

TOTAL production of pig iron in Great Britain during July of this year was 527,200 gross tons, which represented a slight increase over the preceding month of June. Steel ingot production, however, fell off slightly from the preceding month's total, the July output being 718,200 gross tons as compared with 757,500 gross tons for June.

Monthly production in 1933 and the first seven months of 1934 was as follows:

	Pig Iron	Steel Ingots
Jan.	286,600	444,400
Feb.	270,800	482,700
March	332,200	577,700
April	324,700	509,600
May	339,900	599,600
June	345,600	568,800
July	343,900	567,500

Seven months,		
1933	2,243,000	3,750,300
Aug.	362,700	551,300
Sept.	359,700	669,000
Oct.	373,300	668,300
Nov.	374,900	695,000
Dec.	409,300	668,900
	4,123,600	7,002,800

1934		
Jan.	441,300	711,000
Feb.	414,400	707,500
March	503,600	829,700
April	496,300	716,800
May	529,900	780,000
June	515,700	757,500
July	527,200	718,200

Seven months,		
1934	3,428,400	5,220,700

Pig Iron Output in First Half Up 12 Per Cent Over Preceding Half

PRODUCTION of pig iron and ferroalloys in the first six months of 1934, according to the American Iron and Steel Institute, totaled 9,926,956 gross tons, 121 per cent over the 4,488,885 gross tons produced in the first six months of 1933 and 12 per cent above the 8,856,717 gross tons made in the latter half of the year. The total for the half year was the largest since the first six months of 1931.

Pig iron production has shown a steady semi-annual increase from the record low of 3,351,814 gross tons in the last half of 1932, but is still far below the all-time half-yearly high of 21,860,060 gross tons established in the first six months of 1929.

Of the total output of the first half of this year, 9,669,015 gross tons represented pig iron and 257,941 gross tons ferroalloys. Charcoal pig iron accounted for 9508 gross tons.

Of the total amount of pig iron produced only 1,483,951 tons was made for sale, the remainder being for the consumption of producers.

Ohio again led other States in production of pig iron, with a total of 2,736,848 tons. Pennsylvania was second with 2,658,638 tons.

Production of pig iron and ferroalloys by grades is shown in the table.

Production of Pig Iron and Ferroalloys

(In Gross Tons)

Grade	First Half of 1933	Second Half of 1933	First Half of 1934
Pig Iron:			
Basic	2,582,002	5,370,600	6,247,692
Bessemer and low phosphorus	1,350,390	2,123,465	2,191,855
Foundry	254,759	800,863	691,687
Malleable	190,914	304,126	505,504
Forge or mill	887	4,088	19,204
Miscellaneous	11,025	7,600	13,073
Total pig iron	4,389,977	8,610,742	9,669,015
Ferroalloys:			
Ferromanganese and spiegel-eisen	50,648	112,116	90,516
Ferrosilicon	34,816	119,920	150,438
Other ferroalloys	13,444	13,939	16,987
Total ferroalloys	98,908	245,975	257,941
Total pig iron and ferroalloys	4,488,885	8,856,717	9,926,956

output declined by amounts larger than seasonal at this time of the year. Bituminous coal production fell off measurably in July as it did in June, although increases are normally seasonal. Electric power output alone fell off by an amount less than expected during July.

Prices of commodities at wholesale continued to advance in July. The increase of 0.4 per cent brought the July index to 74.8 from 74.5 in June, base, 1926 = 100. Increases in prices of foods, farm products and fuel and lighting materials were sufficient to outweigh decreases in prices of textile products, hides and leather products, metals and metal products, building materials, housefurnishings and miscellaneous items. Chemicals and drugs were unchanged. The July index was 8.9 per cent above that of July, 1933, and was exactly equal to that of April, 1931.

The cost of living index for July advanced to 79.1 from 78.8 in June, base, 1923 = 100. The gain of 0.4 per cent was due to advances in the prices of food, housing, and fuel and light. Clothing prices declined slightly. Consumer costs of sundries remained unchanged. As compared with July, 1933, the cost of living as a whole was 5.2 per cent higher. Prices of department store items were 0.2 per cent lower in July than in June, but 17.7 per cent above the level of July, 1933.

Iron and Steel Institute Meets on Continent

THE autumn meeting of the (British) Iron and Steel Institute will be held in Belgium and Luxemburg. The sessions of Sept. 10 and 11 will take place in Brussels and those of Sept. 13 at the Hotel de l'Arbed, Luxemburg. Welcoming roles will be taken by Leon Greiner, director-general, Société John Cockerill, Seraing, Belgium, and by Aloyse Meyer, director-general, Acieries Reunies de Burbach - Eich - Dudelange, Luxemburg.

The papers to be presented are as follows:

Belgian research committee on the behavior of metals at elevated temperatures, by H. Dustin.

Fatigue properties of patented steel wire, by E. T. Gill and R. Goodacre.

Accelerated cracking of boiler plate under repeated bending, by C. H. M. Jenkins and W. J. West.

Resistance to chemical attack of various special steels, by A. Portevin, E. Prétet and H. Jolivet.

Non-hardenable alpha-iron steels, by S. H. Rees.

Flexibility in the economic exploitation of rolling mills, by G. A. V. Russell, Imperial Chemical Industries, Ltd., Witton, Birmingham.

Physical properties of iron-aluminum alloys, by C. Sykes and J. W. Bampfylde.

Influence of silicon and aluminum on

the resistance of cast iron to high temperatures, by H. Thyssen.

Influence of vanadium on carbon steel and on steels containing nickel and chromium, by H. H. Abram.

Blistering of iron oxide scales and conditions for the formation of a non-adherent scale, by R. Griffiths.

Decomposition of martensite, by Gunnar Hägg.

Iron-rich Fe-Al-C alloys, by F. R. Morral.

Business Down; Prices Up

PRODUCTION and trade fell off more than seasonally in July and the first two weeks of August, according to the monthly report of the Conference of Statisticians in Industry of the National Industrial Conference Board. To the mid-summer dullness usual in July were added declines in major divisions of industrial activity at rates which were greater than in May or June. Prices of non-agricultural items declined slightly in July and the first half of August, while prices of farm products and of foods advanced measurably. Security prices declined during the month; declines were general in all important classes of stocks and bonds.

Productive activity showed visible recessions in recent weeks. Automobile output, building construction, steel and iron production and textile

Briggs to Expand Detroit Plant

BIGGS MFG. CO., 11631 Mack Avenue, Detroit, manufacturer of steel automobile bodies, steel sinks, etc., has asked general contract bids on a one-story addition, 200 x 300 ft., for expansion of its press division. The cost will be over \$100,000 with equipment. Giffels & Vallet, Inc., Marquette Building, is architect and engineer.

Wyckoff Opens Offices At Pittsburgh

WYCKOFF DRAWN STEEL CO., with mills at Ambridge, Pa., and Chicago, has moved its general offices from Ambridge to 1309 First National Bank Building, Pittsburgh.

Foundry Equipment Down in July

NET orders for foundry equipment dropped in July to the index number of 50.7 as compared with 70.4 in June, according to the monthly report of the Foundry Equipment Manufacturers' Association compiled from returns from 21 members.

Traffic League Protests Car Spotting Charge

A PROPOSAL which, if carried, will materially increase the transportation expenses of larger industries is objected to in a brief recently filed with the Interstate Commerce Commission at Washington, by the National Industrial Traffic League. The brief protests against the report of the Commission's director of service, W. P. Bartel, in Ex Parte 104, the so-called "Car Spotting Case." According to the league's brief, prepared by its attorneys, adoption by the commission of Bartel's proposals would differentiate between the service accorded by the railroads generally, to cars delivered at team and individual side tracks on the one hand, and cars spotted upon particular tracks within the areas of large industries on the other. The brief insists that adoption of the proposals would open the way to the imposition of a special charge on such cars in the future, and insists that such an assessment would, in fact, be a spotting charge.

The real point in the league's protest is in the fact that such a charge would violate the long-established

principle that a single charge for the movement of a car covers the entire movement from the point of loading to the point of unloading. In addition, the brief points out, the proposals contemplate what is, in a sense, a discrimination against larger industries. In the case of the smaller industry, which accepts delivery at a team track or on a single side track, no spotting charge could be assessed, whereas the more complicated network of tracks in the area of a larger industry would be amenable to such a charge. As a matter of strict fact, the brief insists, the former services are likely to be more costly to the railroads, since not nearly so large a volume of traffic originates or terminates at the smaller industries.

Again, according to the league's attorneys, the commission itself and the Supreme Court have found in numerous cases that side tracks are not, in fact, private facilities and they find it difficult to conceive how such facilities can be adjudged private for the assessment of special spotting charges.

and treating the washers and guide bars to give them a silvered appearance. The bluing of the bulk of the chain has the effect of placing the silvery parts on a dark blue background, thereby emphasizing the silvery parts.

The trade name Silverstreak has been adopted because when the drive is in operation the motion of the chain describes a silvery streak. Thus, the modernized chain has a distinctive appearance irrespective of whether it is in motion or lying in stock awaiting installation. It is made in all standard types, for both industrial first reduction drives and automotive silent timing; viz., side flanged, middle guide, no back bend and duplex types.

Construction Institute Presents Bridge Plaque

A STAINLESS steel plaque, designating it as the most beautiful bridge of medium size built last year, was unveiled Saturday, Aug. 18, on the Shark River Bridge. The plaque of award was given by the American Institute of Steel Construction. V. G. Iden, acting secretary of the Institute, made the presentation and Hon. James Baker, vice-chairman of the State Highway Commission, accepted the award on behalf of New Jersey.

P. W. A. Announces Sewer Project Allotments

PWA has announced allotments have been made for 648 sewer projects, the total cost of which will be \$212,476,188, of which \$184,728,767 was allotted by PWA. The projects are set forth in complete detail and range from reconstruction of a sewage treatment plant at Eureka Springs, Ark., for which PWA allotted \$12,000, to the Chicago sewage disposal plant, for which \$42,131,040 has been allotted.

Exide News Goes Tabloid

AFTER more than a decade of publication in the conventional form "Exide News," dealer-house organ of the Electric Storage Battery Co., has gone to a new size and format.

Starting with the August issue the publication is now an 8 page 11-in. x 16 1/4-in. gravure tabloid.

The first issue featured the "Exide 3-S Plan," a new and modern battery merchandising program which is being presented to battery dealers by Exide wholesalers at meetings in 300 cities throughout the country.

A. N. Dingee, advertising manager, and Harry Bewley, editor, together with George F. Krauss, associate editor, are responsible for the publication.

Machine Tool Dealers To Meet in Chicago

THE Associated Machine Tool Dealers will hold the annual meeting of their association in Chicago, Sept. 26 to 28 inclusive. Present plans contemplate the meeting being held at the Olympia Fields Country Club.

The opening day is scheduled for the attendance of all members of the trade, regardless of membership in the association. The remaining two days will be occupied by committee meetings and routine business.

To Investigate Barge Movements of Scrap

THE possibility of developing barge movements of scrap from St. Louis to northern consuming markets as well as for export is being investigated by scrap iron dealers, it was stated recently by Benjamin Schwartz, director general of the Institute of Scrap Iron and Steel, on his return from a visit in St. Louis. With the St. Louis scrap market at the lowest point, compared to other markets, with heavy scrap stocks held by steel mills restricting the movement of scrap accumulated by dealers' yards, and with increased operating costs imposed by the scrap iron code, the immediate need for developing new mar-

kets to which scrap might be shipped, in order to save many dealers from financial distress, was expressed at an informal conference of scrap iron dealers who met Mr. Schwartz in that city.

Jessop & Sons Appoint Western Representative

CHARLES G. STEVENS CO., Monroe and Jefferson Streets, Chicago, has been appointed Western sales representative for William Jessop & Sons, Inc., New York. The Chicago warehouse is carrying a complete stock of Jessop's Sheffield tool and die steels, and a technical staff is available for consultation on tool steel problems. This extension of its service also marks the 160th anniversary of William Jessop & Sons, Inc., which in 1774 began the manufacture of crucible steels from Swedish iron.

New "Dress" Given To Silent Chain

IN keeping with today's trend toward greater thought to the aesthetic in designing even the commonest machinery part, Link-Belt Co., Indianapolis, announces that it has given a "new dress" to a 32-year old product, the Link-Belt Silent Chain Drive, by bluing most of the chain,

... PERSONALS ...



FRED C. DOEPKE

FRED C. DOEPKE has been elected president of the Wrought Washer Mfg. Co., Milwaukee, to fill the vacancy caused by the death of his father, FRED D. DOEPKE, who founded the business in 1887 and developed it to the point where it is regarded as the world's largest producer of washers and an important manufacturer of metal stampings, dies, etc. The new president has been secretary of the corporation for some time. CHARLES H. DISCH has been reelected vice-president, and WILLIAM F. DISCH has been reelected treasurer with added duties of secretary. WILLIAM G. HANSON and J. FRED SMITH are additional directors.

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HUGH MORROW, president of the Sloss-Sheffield Steel & Iron Co., and Wade Oldham, Southern vice-president of the Republic Steel Corp., were reelected directors of the Alabama Mining Institute at the annual meeting held Aug. 15.

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HAROLD E. BERGQUIST, for the past 14 years connected with the Chicago sales organization of the Cleveland Twist Drill Co., has been transferred to the New England territory, with headquarters in Boston.

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LEWIS B. LINDEMUTH, consulting engineer, Chrysler Building, New York, will sail Aug. 24 on the American Banker from New York for several weeks stay in England.

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W. M. LESTER has opened an office at 278 Rockefeller Building, Cleveland, for sales of die casting machinery manufactured by the Lester Engineering Co., Cleveland, of which he is the president, and for engineering service in the die casting field.

H. K. POLLARD, who has long been actively engaged in the production and sale of steel castings, has joined the sales staff of the Treadwell Engineering Co., Easton, Pa.

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J. C. REDMOND, a graduate of George Washington University, has joined the staff of the Battelle Memorial Institute, Columbus, Ohio, and will be assistant analytical chemist. Mr. Redmond has been with the Bureau of Standards.

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ALEX N. HANSEN has been appointed district agent in northern California, with offices in San Francisco, by the American Pressed Steel Co., Philadelphia. During Mr. Hansen's long connection with the steel business on the Pacific Coast he has been associated with A. M. Castle & Co., McClintic-Marshall Corp., and, for the past 12 years, with Columbia Steel Co. In addition to representing the American Pressed Steel Co., Mr. Hansen also handles the products of the Eastern Rolling Mill Co., Baltimore.

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J. EDGAR PEW, vice-president, Sun Oil Co., Philadelphia, and chairman of the standards division of the American Petroleum Institute, has been elected to membership on the board of directors of the American



GEORGE A. HIGGINS, whose promotion to the post of assistant manager of sales in the Pittsburgh district for the Carnegie Steel Co. was announced in these columns last week.

Standards Association, on nomination of the A.P.I.

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J. J. RICHARDS has been appointed manager of the Link-Belt Co.'s vibrating screen department, succeeding HARRY L. STRUBE, who has been promoted to the position of assistant chief engineer of the company's Philadelphia plants. Mr. Richards, who started with the company in 1916, will continue to make his headquarters in Philadelphia.

OBITUARY

ARTHUR SCHROEDER, for many years identified with the iron and steel trade at New York, died of heart failure, Aug. 19, while swimming in the Seine River at Gaillois, Province of Eure, France. Mr. Schroeder was born in Brooklyn, Sept. 25, 1859, but lived in Montclair, N. J., from his early boyhood until he retired from business in 1921. His first connection with the metal-working industry was with Manning, Maxwell & Moore. Later he was with Lovejoy & Co., and in 1886 became associated with the Standard Iron Co., Bridgeport, Ohio. In 1892 the Standard Iron Co. merged with the Aetna Iron & Steel Co. to form the Aetna-Standard Iron & Steel Co., and Mr. Schroeder remained with that organization until its absorption into the United States Steel Corp. Mr. Schroeder then went into business for himself for a few years and in 1903 became identified with the LaBelle Iron Works, of which he was New York representative until 1921, when it became a part of the Wheeling Steel Corp. Retiring from business at that

time, he went to France where he made his home up to the time of his death. Among those of his family surviving him is his son, Harold W. Schroeder, district sales manager at New York for the Wheeling Steel Corp.

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ALBERT BLAKE DICK, SR., Chicago manufacturer and inventor of the mimeograph, died Aug. 15 at his home in Lake Forest, Ill. He was 78 years old. He was born in Bureau County, Ill., and received his formal education in the public schools. He received early business training with manufacturers of agricultural implements in Galesburg and Moline. In 1882 he entered the lumber business in Chicago and shortly thereafter originated stencil printing.

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JAMES J. DEVITT, president, Birmingham (Ala.) Ornamental Iron Co., died Aug. 14 at the veterans' hospital in Tuscaloosa, Ala. He was one of the organizers of the Birmingham Ornamental Iron Co. eight years ago and previously was manager of the

(Continued on Page 69)



THE WEEK IN WASHINGTON

Designers Working on New Model of NRA

More Scope for the Back Seat Drivers Contemplated In Board Set-Up

By L. W. MOFFETT

Resident Washington Editor, THE IRON AGE

WASHINGTON, Aug. 21.—Reorganization of NRA is expected to be announced soon, probably from the White House, where conferences with President Roosevelt are about to be concluded. Indications are that NRA will be placed under a board with an executive officer at its head. This is the form of reorganization recommended by General Hugh S. Johnson, the administrator, who has stated that since the NRA has entered almost exclusively into the administrative field it is "no longer a one-man job." There is a question, however, as to what part, if any, the Federal Trade Commission may play in the new set-up. The problem has proven a matter of diverse views. This is due to the contrasting policies of NRA and the commission. The former, operating under liberalized anti-trust laws, permits forms of price control which run counter to the policy of the commission, which holds fast to these laws, except for certain liberalization of the Clayton anti-trust act which permits of price discrimination in given circumstances. It is reported that legislation may be necessary to reconcile the policies of the two organizations.

NRA officials generally are opposed to the commission taking over the NRA and it is not believed this will be done, but it may be given a greater voice than it now has in its conduct. Donald Richberg, former general

counsel for NRA, has undertaken the principal job of framing the new organization for NRA which it is intended to establish soon, acting in his position as a coordinator of Government organizations. It is also reported that consideration is being given to having an advisory council of 21 industrialists, suggested by Secretary of Commerce Roper, given a voice in the new NRA.

The new organization would be tried out and perfected from time to time pending the next session of Congress, when legislation for making it permanent is expected to be offered.

Price Problem a Storm Center

The price problem is increasingly becoming a storm center of NRA with a definite tendency toward removing price protection except to bar selling below cost. Even the latter is not prohibited any longer in some codes. This is no doubt a matter that will receive serious consideration in connection with reorganization plans. Labor, of course, will insist that, regardless of what new legislation is enacted, it be fully recognized, and while Section 7 (a) may be clarified or modified in some way it is evident that organized labor will insist upon the right of collective bargaining. Minimum wages and maximum hours likewise are expected to be urged, although prior to enactment of the

recovery act organized labor's policy was against the fixing of minimum wages on the theory that they would be made maximum wages as well. Simplification of codes is another idea that appears to be in mind, many feeling that they should not go beyond the fixing of minimum wages, maximum hours and adoption of relatively few trade practices. The absence of price protection, however, would undoubtedly mean a sharp drop in enthusiasm for NRA.

General Johnson in again speaking last week of reorganization with the establishment of a board, like a board of directors of a corporation, and an executive officer similar to a chairman of the board, said he had not left a place open for himself. He again stated, however, that he would remain with NRA if the President desired, though the belief grows the administrator would like to return to private life as have so many officials of NRA, the latest being Col. R. W. Lea, who resigned last week.

The contention is made that a board could conduct NRA more satisfactorily than could a single head by reason of the importance and difficulty of the various problems of policy that have developed with increased force the further NRA entered into its administrative work. Interpretations and application of the law are proving especially serious.

Regional Labor Boards May Be Given Power to Order Elections

WASHINGTON, Aug. 21.—The delegation to regional labor boards of statutory powers, the most important of which would be the ordering and conducting of elections of employees under Section 7a of the National Industrial Recovery Act, is being considered by the National Labor Relations Board.

Under the executive order promulgated by the President in connection with the joint resolution creating the National Labor Relations Board, the latter is authorized to recommend to the President the creation of regional boards with these statutory powers. In its first report to the President and Secretary of Labor Frances Perkins, submitted last week, the board said it does not recommend such a step at this time. It considers it wiser to wait "at least until the regional board machinery has been perfected, and until our board has had the necessary experience in exercising its own statutory powers."

The board hopes to announce definitely its policies in its next monthly report. Views have been gathered from chairmen and executive secretaries of regional boards, members of the steel and automobile boards, the old National Labor Board, and some of the industrial boards and representatives of the Department of Labor, Department of Justice and the NRA.

The board's report points out that the number of cases before the regional boards, and the number which are being referred to the national board after efforts at settlement by the regional boards have failed, make it clear that the most time-consuming and perhaps most important task will be the decision of controversies arising under Section 7a.

"The interpretation of Section 7a, like the interpretation of any statute couched in general terms, is a continuing process," says the report.

"While the old National Labor Board, in the course of its 258 opinions, established a number of principles which are so clear as to require no further discussion, these principles must constantly be applied to new situations in which the facts may be either in dispute or so different in texture from any preceding situation as to leave room for doubt or argument. In addition, questions are arising and will continue to arise under Section 7a which have not been passed upon in any form by any tribunal. There is then no short cut. If Section 7a is to be enforced, as it must be enforced, some agency of the Government must pass authoritatively upon each unsettled case as it arises, and that we take to be the duty of this board."

The report proceeds to point to the

necessity of both just and prompt decisions under Section 7a and, in order to avoid delay in hearings, decisions and enforcement, the board says it will do its utmost to expedite these processes. It declares that the key to expedition lies in the localities where they arise and that nothing is more wasteful of time and money than bringing witnesses to Washington. Each regional board, it is stated, must be so set up and so staffed and equipped that it may hear cases without delay and make such adequate records of the proceedings that if compliance with its recommendations does not follow, the cases may be immediately heard and disposed of by the national board without the necessity of further testimony.

"In cooperation with the regional boards we are taking steps to perfect the necessary administrative machinery for the accomplishment of these ends," says the report. "The task cannot be completed over night, but we are making progress."

Every effort, it is stated, will be made to promote harmonious settlement of controversies and to reduce to a minimum the cases requiring decision and enforcement. In Section 7a cases brought before it, the board says, it will try to compose the differences between the parties and to bring about settlements.

"But such settlements will not be urged unless they can be achieved without delay and without violating the principles of Section 7a," the report continues. "Except where the parties may appear before us, the board cannot as a practical matter engage directly in mediation work which, to be effective, must normally take place in the field at the seat of the controversy. The mediation work of the regional boards and the conciliators of the Department of Labor is based upon this sound principle."

The board said it would also hold itself in readiness at all times to arbitrate those disputes which are submitted to it, whether they involve Section 7a or not, and that every endeavor will be made through the regional boards and in cooperation with the Department of Labor to encourage a more general resort to arbitration.

Obviously, it was stated, the processes both of mediation and of enforcement of Section 7a will be strengthened by adequate cooperative arrangements with the various industrial boards which have been set up under the codes and which are now exercising these dual functions.

"Pursuant to the directions in the executive order, we are studying the activities of these boards with a view to working out the necessary cooper-

ation, and with a view to recommending to the President whether or not these boards, or any of them, should be clothed with the statutory powers under the joint resolution," the report declared. "In cooperation with the National Recovery Administration we are also studying proposals for the creation of additional industrial boards; and pursuant to the executive order we are inquiring to what extent, if any, special boards should be created by the President to deal with labor controversies in particular industries.

Naval Awards Expected This Week

WASHINGTON, Aug. 21.—The Navy Department is expected to make awards this week on 12 naval vessels on which bids were opened last Wednesday. Allocation of a similar number to the navy yard is also expected to be made at about or near the same time. Bids were opened for one heavy cruiser, one light cruiser, two 1850-ton and five 1500-ton destroyers and three submarines. Allocations to navy yards will consist of one heavy cruiser, one light cruiser, seven destroyers and three submarines.

Fourteen shipbuilding companies submitted 29 major bids in connection with the opening for the 12 vessels. The bids were accompanied by alternate proposals on the basis of adjustments for labor and material. Supplementary proposals for modification of design of certain vessels or materials were submitted by several companies. The bids on the destroyers were especially complicated and until they have been studied it will not be definitely known who the lowest bidders were.

The Federal Shipbuilding & Dry Dock Co., Kearny, N. J., was the lowest bidder on the heavy cruiser, at a figure of \$13,889,000 on the straight proposal and an alternate bid of \$12,889,000. On the light cruiser, bids of the Newport News Shipbuilding & Dry Dock Co., Newport News, Va., were \$13,700,000 and \$11,900,000 respectively, while respective bids of the Gulf Industries, Inc., Pensacola, Fla., were \$12,600,000 and \$12,250,000. The Federal company also was lowest bidder on the straight proposal for the two heavy destroyers at \$5,258,000 for one or \$4,608,000 each for two. The lowest alternate bids on these two vessels were submitted by the United Dry Docks, Inc., New York, at \$4,570,000 for one or \$4,000,000 each for two. The lowest bidders on five 1500-ton destroyers were apparently the General Engineering & Dry Dock Co., Oakland, Cal., the Gulf Industries and the United Dry Docks. The Electric Boat Co., Groton, Conn., was apparently the lowest bidder on the three submarines.

Government Seeks to Speed Lagging Industry Loans

WASHINGTON, Aug. 21.—Industry has indicated strong approval of the action of President Roosevelt in selecting Eugene R. Black to act as liaison officer between the Administration and banks of the country, which, it is hoped, will mean increased efforts to stimulate capital goods industries through loans. This step was taken by the President following his acceptance of the resignation of Mr. Black as governor of the Federal Reserve Board. Governor Black long has withdrawn from the board, due partly, it is reported, to his lack of sympathy with the Administration's currency policies. Governor Black, however, never openly indicated dissent with these policies but on the contrary cooperated fully with the Administration, a natural service so long as he was head of the board.

It has not been made clear what the work of Governor Black will be in his new position, other than to suggest lines of cooperation between the Administration and banks of the country in financing a program looking to industrial recovery. It has been indicated that while necessarily the Federal Reserve system will take a part in the program, it will not be of the primary importance previously occupied by it.

Industrial Loans Are Small

Disappointment has been expressed at small amount of industrial loans being made and it has been reported that Governor Black may take an active part in developing greatly increased loans as a means of assisting the durable goods industries. It is a question, however, as to how this can be done. The report last week of the Federal Reserve operation indicated that for the week ended last Wednesday reserve banks had made advances of only \$214,000 in direct loans to industries under industrial loan act, sponsored by Senator Carter Glass of Virginia. One reason for the small amount of loans is that both the Reconstruction Finance Corp. and the reserve banks found but few sound and deserving enterprises seeking funds. There are those who think the greatest difficulty is the lack of confidence in industry and it is urged that this must be restored before applications for large loans by sound industries will be made. The Glass law provides for a total of \$280,000,000 and while especially designed to aid small industries, it was also considered a potential source for loans to some of the larger enterprises. Likewise, it was felt that a flow of money from this source would develop greater financing activities generally, both

from private and governmental sources.

Lack of Credit Hampers

Chairman Jesse Jones of the RFC, authorized to lend up to \$300,000,000 directly to industry for capital purposes, said last Thursday that up to that time 94 loans had been authorized for an aggregate of about \$7,000,000, though applicants totaled several thousand. Lack of credit, it was indicated, was the reason for the small amount of loans as against the large number of applicants. This development substantiates contentions made by conservative members of Congress last winter that banks, contrary to the general opinion, were accommodating requests for capital when coming from sound enterprises. At the same time it was agreed that in some instances there were perhaps some sound enterprises needing capital but were unable to get it by reason of peculiar circumstances. It was to aid the latter class and to prevent excessive authorization of government loans that the Glass act was enacted.

Allotment Made For St. Lawrence Bridge

WASHINGTON, Aug. 21.—Allotment of \$2,800,000 to the St. Lawrence Bridge Commission for construction of a high level toll bridge across the river between Ogdensburg, N. Y., and Prescott, Ontario, Canada, has been announced by Harold L. Ickes, Public Works Administrator. The loan and grant was made on condition that the commission furnish \$1,200,000 toward the cost of the project, which will be secured by a second lien on the operating receipts.

The PWA also has allotted \$465,000 to the Bureau of Air Commerce, Department of Commerce, for installation of a lighted airway from Washington to Nashville, Tenn. Stations will be installed at or near Culpeper, Warren, Lynchburg, Roanoke, Pulaski and Marion, all in Virginia, and Bristol, Morristown, Knoxville, Harriman and Sparta in Tennessee. Each station will cost about \$19,000.

Administrator Ickes also has announced complete reorganization of the PWA housing division and has stated that obstacles are being overcome in pushing forward the national low-cost housing and slum clearance program. Contradicting reports, he said that the Government has no intention to abandon its low-cost housing and slum clearance activities.

The housing division is now under the direction of Col. Horatio B. Hackett.

Announcement also was made of revision of three allotments for limited dividend housing corporation loans totaling \$7,765,000. The rescinded allotments were: Hallets Cove Garden Homes, Inc., for a low-cost housing project at Astoria, Queens Borough, New York, \$2,975,000; Hillcreek Homes Corp., Philadelphia, \$1,290,000, and Neptune Gardens, Inc., Boston, \$3,500,000.

Chevrolet Gets Contract For Army Trucks

WASHINGTON, Aug. 21.—The Quartermaster General, Major-General Louis H. Bash, has awarded a contract to the Chevrolet Motor Co. for 750 trucks, 1½ ton, light chassis, cargo body, at \$501,970.78. Of the total, 506 trucks are to be built at Flint, Mich.; 118 at Janesville, Wis.; 67 at Oakland, Cal.; 45 at Tarrytown, N. Y., and 14 at Kansas City.

More Dam Millions

WASHINGTON, Aug. 21.—Harold L. Ickes, Public Works Administrator, has gone to Eastport, Me., to make a study of the Passamaquoddy tidal power plant project, which has been brought before PWA in the form of an application filed by Dexter P. Copper, Inc., Eastport, requesting a loan of \$47,000,000 for the construction of a tidal power plant, equalizing plant and aluminum and stainless steel plants. Previously PWA held up action on the project. Mr. Ickes was accompanied by Maj. Philip B. Fleming, army engineer, now serving as executive officer of PWA, who is visiting the site of the proposed development.

PWA Issues List Of Educational Projects

WASHINGTON, Aug. 21.—The PWA has issued a detailed list of 965 educational projects whose total cost for construction, addition and repairs will be \$160,603,032. Of this figure, \$126,755,474 has been advanced as PWA allotment, the remainder coming from local sources. Allotments for State, municipal and district school buildings total \$115,798,438. Construction resulting from these allotments will total \$149,645,996, the remainder coming from local school bodies. In addition, PWA advanced \$10,957,036 as outright grants to Federal educational institutions for buildings.

Code Doings and Undoings

Metal Treating Industry

THE NRA has issued orders terminating the exemption granted under paragraph 3, of administrative order X-36, in so far as it affects the metal treating industry. The paragraph referred to exempts members of industries and trades from contributing to the support of any code except that under which their principal line of business is carried on. The exemption is terminated for the metal treating industry with the proviso that the termination will not apply to those who do metal treating as a part of the manufacturing process of their products.

* * *

Railway Car and Locomotive Journals

DEPUTY ADMINISTRATOR J. G. COWLING has announced that any objection to the proposed budget and schedule of contributions for the support of code administration in the railway brass car and locomotive journal bearings and castings manufacturing industry must be submitted prior to Aug. 30.

* * *

Unit Heater and Ventilator Code

THE fan and blower, and the unit heater and unit ventilator manufacturing industries have submitted to the administrator for approval their budgets for administrative expenses together with schedules of contributions by industry members and requests for termination of the exemption granted under paragraph 3, of administrative order X-36. The paragraph referred to exempts members of industries or trades from contributing to the support of any code except that under which their principal line of business is transacted.

* * *

Gray Iron Code

A REQUEST that Arkansas be placed in the southern instead of the border States group affected by minimum wage provisions of the code for the gray iron foundry industry has been made by the Arkansas Metal Trade Assn. and the Standard Brake Shoe & Foundry Co. of Pine Bluff. Under the code, members of the industry in Virginia, Tennessee, Arkansas, Oklahoma and Texas are required to pay a minimum hourly rate of 30c; while the rate for North and South Carolina, Georgia, Florida, Alabama, Mississippi and Louisiana is either 28c. or the rate paid July 15, 1929, but not less than 25c. per hr. Samuel M. Levine, appearing for the Standard Brake Shoe & Foundry Co., presented the case for the applicants. He declared that the code, in effect, was making a border State of what "by every possible test is essentially a southern State." The plant which he represents, Mr. Levine said, produced more steel than gray iron; and the minimum wage rate under the steel code was 25c. The workers, particularly those being paid the minimum rate, are used interchangeably in both forms of production, he declared; and he also pointed out that the principal industry in Arkansas is lumber, which permits a minimum rate throughout the State of 24c. H. L. Brunson, of the NRA Labor Advisory Board, inquired whether 10 per cent wage increase ordered in the steel industry had been put in effect by his plant. Mr. Levine replied he had not been notified of any such increase but that bonuses

paid to the men would more than cover the increase. Mr. Levine also pointed out that his company's strongest competition came from Louisiana and Alabama, where the 25c rate was permitted. W. A. Calvin, representing the Metal Trades department of the American Federation of Labor, opposed the exemption on the ground that the desire was to require higher hourly rates rather than lower.

* * *

Wire and Iron Fence Industry

DEPUTY ADMINISTRATOR NEAL W. FOSTER has announced that any objections to the proposed \$11,960 budget to defray costs of code administration for the complete wire and iron fence industry during the six months commencing July 13, 1934, must be submitted to him in Room 3082, Department of Commerce Building, Washington, prior to Aug. 31. It is proposed that members of the industry pay one-half of one per cent of the total invoiced sales for each month on the fifteenth of the second succeeding month. The code authority also asks for termination of the exemption granted under paragraph 3, of administrative order X-36, which provides that members of industries or trades shall not be required to contribute to the support of any code except that under which their principal line of business is transacted.

* * *

Pump Manufacturing Code

HEARINGS on a proposed uniform method of filing prices by the pump manufacturing industry, and also on a request of the Wilson-Snyder Mfg. Corp., Pittsburgh, for exemption from Articles VII and XIII of that industry's code, will be conducted by deputy administrator Neal W. Foster on Aug. 29.

It is proposed that current prices, discounts and terms of sale and payment may be filed by industry members in two ways:

"(a) By size of pump or manufacturer's figure number accompanied by complete performance charts or curves for such types, sizes and speeds as defined by the official call for filing prices issued by the Supervisory Agency.

"(b) By filing for such types, sizes and speeds, as defined by the official call for filing prices issued by the Supervisory Agency, the price for individual capacity, head and speed conditions."

The Wilson-Snyder company, it was announced, is seeking exemption from the necessity of supplying information to the Hydraulic Institute, supervisory agency for the code, and from the required filing of prices.

Job Galvanizing

DEPUTY administrator Neal W. Foster has announced that any objections to the proposed \$11,750 code authority budget for the job galvanizing metal coating division of the fabricated metal products manufacturing and metal finishing and metal coating industry, must be submitted to him in room 407, 1518 K Street, N. W., Washington, prior to Aug. 29. The budget covers costs of code administration for the six months commencing May 27, 1934. Members of the industry would be expected to contribute one-half of one per cent of total sales of job galvanizing for the year 1933. The divisional code authority also has asked termination of

the exemption granted under paragraph 3, of Administrative Order X-36, which frees members of industries or trades from the necessity of contributing to the support of any code except that covering their principal lines of business.

Open Die Forging Code

HEARING on a proposed code for the open die forging industry will be conducted by deputy administrator Walter A. Janssen on Aug. 22.

Locomotive Manufacturing Code

HEARING on proposed modifications of the approved code for the locomotive manufacturing subdivision of the machinery and allied products industry, will be conducted Aug. 29 by deputy administrator J. G. Cowling. The proposed modifications affect the industry's trade practices, especially with regard to the giving of rebates, credit or discounts.

Cast Iron Soil Pipe

MODIFICATION by the NRA of determining minimum prices for certain products of the cast iron soil pipe industry has been announced. The determination of such prices was given in an administrative order dated July 16, 1934. The action was in accordance with an amendment to the industry's code of fair competition. The prices were determined on the basis of a stated minimum price per ton, f.o.b. Birmingham, plus the published freight rate to destination.

Reports from members of the industry were that the general effect of the determination of minimum prices had been beneficial, but that the method of determination had resulted in some hardship on small manufacturers at a distance from Birmingham, with respect to sales of less-than-carload lots of pipe and fittings to purchasers in their immediate territory.

The order of modification specifies that the part of the original order dealing with minimum net prices shall be changed to read as follows:

"It is hereby ordered and published that after deduction of all discounts and allowances, the minimum net prices per ton of 2000 lb. f.o.b. Birmingham, Ala., for the following products of said industry, for the period from date hereof until the expiration of the time limit as provided in Administration Order No. 18 —8, hereafter shall be:

"\$27.50 for extra heavy weight soil pipe
"\$32.50 for medium weight soil pipe
"\$37.50 for standard weight soil pipe

"\$42.50 for soil pipe and fittings plus the published carload all-rail freight rate to destination and no member of said industry shall sell any such products at a net realized price below said aforesigned minimum prices and published freight rate to destination, provided, however, that with respect to shipments between the west coast of the United States and points east of the Rocky mountains, published carload rail and water freight rates to destination may be added to said f.o.b. Birmingham prices in lieu of the said all-rail freight rates."

* * *

Administration Members Appointed

THE NRA has announced appointment of Administration members to code authorities of the following industries:

Complete Wire and Iron Fence Industry—C. L. Converse, a real estate broker of Columbus, Ohio.

Multiple V-Belt Drive Industry—E. G.

Vail, executive secretary of the household ice refrigerator code authority.

Nonferrous and steel convactor manufacturing industry—G. E. Putnam, economist and manager of the research department of Swift & Co., Chicago.

THE appointment of Daniel L. Morris, New York attorney, as administration member of the code authorities for the safety razor and safety razor blade manufacturing industry, and the hydraulic machinery industry, has been announced by the NRA.

Code Authorities Approved

THE NRA has announced its approval of members of the following code authorities:

Warm air register industry—R. W. Blanchard, president, Hart & Cooley Mfg. Co., Chicago; C. J. Pearson, vice-president, United States Register Co., Battle Creek, Mich.; and E. C. Fox, president, Independent Register & Mfg. Co., Cleveland.

Anti-friction bearing industry—William E. Umstattd, president, Timken Roller Bearing Co., Canton, O.; F. G. Hughes, general manager, New Departure Mfg. Co., Bristol, Conn.; F. O. Burkholder, vice-president, Ahlberg Bearing Co., Chicago; H. A. Schutz, president, Federal Bearings Co., Inc., Poughkeepsie, N. Y.; A. C. Davis, vice-president, Marlin Rockwell Corp., Jamestown, N. Y.; and G. A. Strom, president, Strom Steel Ball Co., Chicago.

Railway and industrial spring manufacturing industry—A. S. Henry, president, Railway Steel-Spring Co., New York; H. C. Bughman, Jr., vice-president, Union Spring & Mfg. Co., New Kensington, Pa.; F. K. Metzger, vice-president, Standard Steel Works Co., Burnham, Pa.; A. H. Peck, manager, brake and steel department, American Steel Foundries, Chicago; Harry Wilson, president, American Spiral Spring & Mfg. Co., Pittsburgh; H. A. Noble, president, Pittsburgh Spring & Steel Co., Pittsburgh; and H. S. Sherman, president, Fort Pitt Spring Co., Cleveland.

Warm air furnace pipe and fittings industry—Carl Weyand, president, Henry Weyand Co., Waterbury, Conn.; Aaron Cohn, president, Acme Tin Plate & Roofing, Philadelphia; George Hunt, president, Henry N. Clarke Co., Boston; R. G. Harrison, sales manager, Reeves Mfg. Co., Dover, Ohio; E. S. Moncrief, president, Henry Furnace & Foundry Co., Cleveland; A. W. Glessner, president, Excelsior Steel Furnace Co., Chicago.

Saw mill machinery—J. L. Monaghan, Filer & Stowell, Milwaukee; Loren L. Prescott, The Prescott Co., Menominee, Mich.; A. E. Hall, Allis-Chalmers Mfg. Co., Milwaukee; G. A. Bingenheimer, Diamond Iron Works, Minneapolis; J. S. Reid, Clark Bros., Olean, N. Y.; Z. W. Wheland, The Wheland Co., Chattanooga, Tenn.; George B. Sumner, Sumner Iron Works, Everett, Wash.

Wire rope and strand manufacturing industry—George C. Moon, American Cable Co., Wilkes-Barre, Pa.; John May, American Steel & Wire Co., Worcester, Mass.; H. W. Bennett, Belleville Wire Rope Co., Belleville, N. J.; H. A. Wood, E. H. Edwards Co., San Francisco; C. E. Bascom, Broderick & Bascom Rope Co., St. Louis; Harry J. Leschen, A. Leschen & Sons Rope Co., St. Louis; Emerson Spear, Pacific Wire Rope Co., Los An-

geles; J. H. Blanchard, John A. Roebling's Sons Co., Trenton, N. J.; M. G. Ensinger, Union Wire Rope Corp., Kansas City; R. H. Cherry, Wickwire Spencer Steel Co., New York; G. B. Gemmill, Wire Rope Mfg. & Equipment Co., Seattle; W. B. Sawyer, Columbia Steel Co., San Francisco; George S. Whyte, Macwhyte Co., Kenosha, Wis.; W. L. Rochester, New York Cordage & Cable Co., New York; C. M. Ballard, Williamsport Wire Rope Co., Williamsport, Pa.; and H. Hartman, Indiana Steel & Wire Co., Muncie, Ind.

Complete wire and iron fence industry—W. H. Bleeker, Page Steel & Wire Co., Monessen, Pa.; W. F. Brannan, president, Anchor Post Fence Co., Baltimore; J. S. Eskin, Spencer Steel Co., New York; J. T. Hanley, American Wire Fence Co., Libertyville, Ill.; C. E. Kendall, Pittsburgh Steel Co., Pittsburgh; H. I. Raymond, Enterprise Iron Works, Indianapolis; W. L. Robertson, W. F. Robertson Steel & Iron Co., Cincinnati; W. S. Rich, Stewart Iron Works Co., Cincinnati; and M. J. Sayles, Independent Fence Co., Brooklyn.

Steel Labor Board Action May Bring Court Test

CHARGING that labor boards have no legal powers and that their creation was unconstitutional, Earl F. Reed, counsel for the Wheeling Steel Corp. and attorney for the Weirton Steel Co., laid the groundwork Monday for what may be a final test of New Deal authority as applied to labor relations.

The occasion for this challenge was the hearing at Portsmouth, Ohio, before the Steel Labor Board, at which complaint was brought by the Amalgamated Association of Steel, Tin and Wire Workers against the Wheeling Steel Corp. for alleged non-compliance with Section 7-a of the Recovery Act. The union, which claims a majority membership among the company's employees, seeks to be recognized as the exclusive representative of all employees for the purpose of collective bargaining. It also seeks to compel the opening of the plant which it charges has been closed in retaliation against union activities but which the company states has been shut down because of lack of orders.

Mr. Reed objected to the Steel Labor Board assuming jurisdiction in the case on the following grounds:

1. The Recovery Act and the joint Congressional resolution under which the board was created "are void and unconstitutional" as they attempt to give the board jurisdiction over matters not subject to Congressional regulation.

2. The Recovery Act and the joint Congressional resolution do not empower the board to investigate controversies between employers and employees engaged in manufacturing and (or) production, as manufacturing and production do not affect interstate commerce.

3. Even if the validity of the Recovery Act and the joint Congressional resolution were admitted, neither one nor the Executive order of President Roosevelt creating the board confers jurisdiction upon the board.

4. The President's Executive order "is not authorized by said Recovery Act or said joint resolution and is void and illegal as a usurpation of legislative power."

5. The Recovery Act, the joint reso-

lution and the Executive order "are invalid and unconstitutional in that they attempt to deprive the respondent of its property without due process of law."

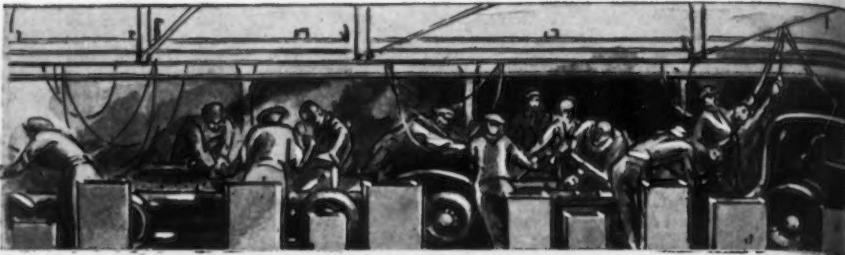
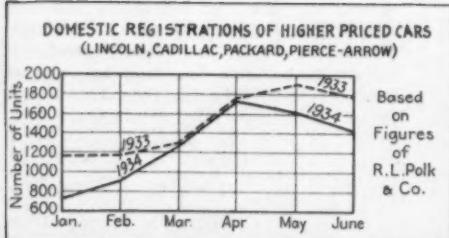
6. As the Portsmouth plant of the Wheeling Steel Corporation is not in operation the board has no authority to order its operation and as no employees are working there is "no occasion for the determination of any question of discrimination."

7. As the employees have "a form of collective bargaining known as the employees' representation plan, the officers of said employees' organization are interested parties in this controversy and were not summoned and are not before the board."

Action by the steel producers to determine the legality of the Steel Labor Board decisions will undoubtedly hinge upon the ruling of the National Labor Board with regard to the right of minorities to be represented in collective bargaining. Thus far there has been no definite pronouncement on this mooted question by the National Labor Board. The principle "test case" pending in this connection is that of the Houde Engineering Corp. If the board takes the viewpoint of Senator Wagner that majorities are entitled to exclusive representation in collective bargaining, there is little doubt that the decision will be fought through to the highest tribunal, involving possibly the question of constitutionality of the Recovery Act.

In the meantime, there is little foundation to the published rumor that the steel industry is considering the abandonment of its code. The attitude of the industry has been one of cooperation with the purposes of the Recovery Act. There is small likelihood of this attitude being reversed until and unless there should develop interpretations of Section 7-a through board rulings that the industry considered incompatible with the basic welfare of industry.

The Dumore Co., Racine, Wis., maker of portable grinders, drilling machinery and electric motors, has joined the American Standards Association as a company member.



THIS WEEK ON THE

Car Makers Delay Retooling; Economies Are Emphasized

DETROIT, Aug. 21.

MOTOR car manufacturers are nearing the end of August without having made much progress toward preparations for new models. The best index of how far the industry has gone in the direction of 1935 lines is the amount of tool and die business placed. To the discomfort of local shops, the volume has been slim. At the same time the fact has been well established that little work has been given to outside shops, despite the recurring reports that automobile companies secretly have distributed orders around the country.

It already has been pointed out in this column that 75 per cent of the production capacity for certain types of tool and die work is located in the Detroit area. Moreover, Detroit shops have had years of experience in making automotive dies. No one realizes the value of this experience more than the car maker. Local companies are said to have assurance that as soon as the work to be let is ready, it will be allotted in large measure to them. Within two weeks, or 30 days at the latest, tool and die shops in southern Michigan should be humming with activity.

The disconcerting deliberation with which the industry is going about the development of new cars is not so hard to explain. The New York show in January, no longer a national affair operated by the N.A.C.C., doesn't offer the manufacturer the incentive it formerly did to reveal his complete line of 1935 models. The pressing importance of having the New York show as a final date for getting production under way has been removed.

Automobile Code Expires

Then there is the fact that the automobile code expires on Sept. 4. Many people outside the industry have for-

gotten this, but the manufacturers haven't. It is more than likely that the managements of many companies want to wait and see how possible changes in the code affect costs before giving a "go-ahead" signal to their production officials. Tied in with the code problem is the matter of the industry's nervousness about the national Administration's future policy. The jittery state of the nation's nerves has communicated itself to automotive executives, who are exhibiting a caution about making decisions which was unknown in Detroit a few years ago.

There is still another excellent reason why car makers are prolonging the lives of current models. Profits per unit have been considerably less this year than in 1933. The larger the total volume of 1934 cars sold, the greater the profit per car, and conversely the smaller the tooling expense per car. The squeezing of an extra month or two into the current model year, therefore, means much to the industry.

Offhand, one might think that Fisher Body's expenditure of \$3,000,000, announced in this column on Aug. 16, is a sign that the cautious policy of the industry is being swept aside. The truth is that Fisher is making this capital outlay largely in self-defense. That is, with the profit per new car dwindling rather than expanding, manufacturers are compelled to spend money wherever they can for new equipment or improved processes in order to cut the cost of this part for that operation.

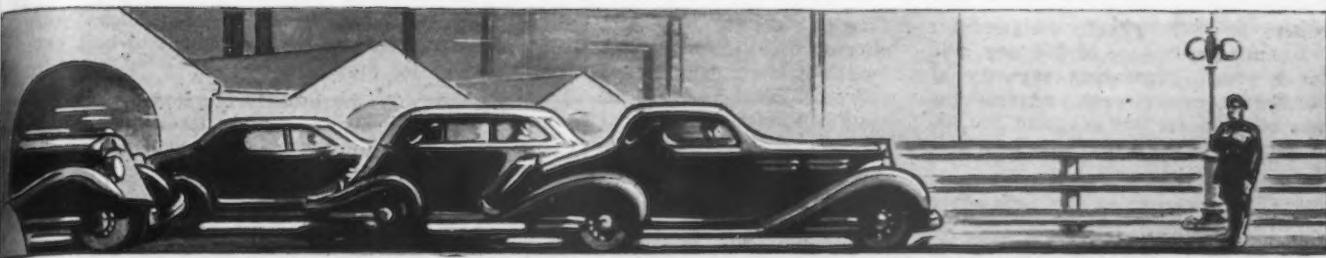
Car Makers Face Inelastic Market

Car makers are facing a serious problem in the form of an inelastic market. They have found that material and labor costs have mounted painfully in the last year, yet the pub-

lic will not buy cars if the retail price is raised above present levels. The public has been educated to expect bigger and better cars at less money, therefore manufacturers dare not eliminate too many costly gadgets for fear that buyers will turn to cars made by competitors. The only remaining recourse is to concentrate on reducing manufacturing costs. One company in the low-price field is examining its product and plants minutely in an effort to discover ways and means of cutting costs. This examination includes materials as well as equipment and processes. It is no exaggeration to say that the maker of materials never before has had a greater chance than at present to have his product given detailed consideration by automobile companies. This is evidence also that the manufacturer whose material is now being used should be alive to his competition and see that his automotive business does not fall into the hands of others.

The situation just presented is not without meaning for equipment builders. Purchases of new machine tools to plug weak spots in the production line, to improve quality of the product and to achieve mechanization of manufacturing processes loom brighter on the automotive horizon than they have in several months. One company the past week spent \$60,000 for installation of new equipment and another company allied with the automobile industry approximately \$30,000. The Packard program appears considerably nearer action than it did a week ago; odds strongly favor the new group of executives who are insisting on the expenditure of large sums for modernization of equipment.

Miscellaneous machine tool business now pending is of fairly good volume. It is originating in a number of plants, including divisions of General Motors and Chrysler. How



E ASSEMBLY LINE

much of it will be closed shortly is debatable. Ford is reported to have decided to wait until probably early next year before purchasing machinery for its spare production line at Rouge. Much of the present equipment along this line is being shipped to France, where Mathis will make the V-eight Ford. It is understood that the air-conditioning unit to be made and marketed by a recently organized division of Chrysler Corp. may be manufactured at the start in the Dodge plant. It is not yet known whether any new equipment will have to be bought for the production of this unit.

In the face of the acute drought in agricultural districts, a more than seasonal summer decline in industrial activity, the dubious prospects of a brisk pick-up in the fall and an Administration which business men believe is putting obstacles in the path of recovery, automotive executives privately are voicing optimistic sentiments about 1935. The industry plumbed the depression's depths in 1932, when total production in the United States and Canada dropped to 1,431,494 units, the lowest point since 1918. To be exact, the industry scraped bottom in October, 1932, when only 51,625 cars were assembled, or less than 8 per cent of capacity. Output in 1933 rose to 1,985,909 units, and this year the total should be not far below the three million mark. Top executives are thinking of 1935 as another recovery year. Pegged in their minds is the belief that the increase over the present year ought to be 15 to 20 per cent. At best, all of this is guesswork, but it is indicative of the terms in which the industry is thinking.

Independent Springing Discussed

Independent springing just now is a subject of much discussion in Detroit. The cost of making knee-action units this year has given production officials a severe headache. The growing emphasis on economy will prevent the extension of these units to rear wheels next year. In fact, the opinion is far from unanimous that independent springing, at least of the present type with coil springs, is here to stay. General Motors, of course, is definitely committed to a continuation of knee-

By BURNHAM FINNEY
Detroit Editor, THE IRON AGE

action wheels by the stress which it has put on this feature this year. Chrysler has not emphasized independent springing so much, subordinating it to other sales points. It could eliminate it with better grace than General Motors. Despite this fact, it is regarded as improbable that Plymouth will completely drop independent springing next year in the interests of economy, as intimated by reports circulated in Detroit. Plymouth this year has independent springing on some models and has retained the conventional front axle on other models.

In certain cases parts suppliers are being asked by Chevrolet and Chrysler to put in prices for the first half of 1935, deliveries to begin late this year when production of new models is started. It is believed that some of the figures are being asked mainly so that factories can estimate costs on 1935 cars rather than because of the possibility of early specifications being released. On the other hand, Chevrolet is expected to award contracts soon and give initial releases within 30 days. Ford likewise is about to ask for prices on some parts for its new models.

The industry is entering the final selling period for current lines in remarkably healthy condition. Field stocks are not excessive. Clean-up sales at bargain prices will be few in number. One company which early in the year overproduced has been so conservative the last two months that it has found it necessary to increase output considerably in order to keep dealers from going through a period of several weeks toward the end of the model year without a car to sell.

Chevrolet's decision to build an assembly plant at Baltimore is said to have been influenced by several factors. Foremost was a desire to have ample capacity so as not to get caught short of cars in the early months of the coming year, as it was in the first quarter of 1934. Another factor was

that Baltimore is a good location from which to ship cars to South America. Then the district along the Atlantic Coast has suffered less from the depression than other parts of the country, has not been affected by the drought and has benefited from Federal payments for crop curtailment. Sales, therefore, should be brisk in this area during 1935. Commercial car and truck sales in the Baltimore districts also are reported to have been good.

A late check-up of August production shows that it probably will total 240,000 units, thus slightly exceeding the 238,934 cars made in August of last year. It is impossible to tell what September output will be except that the anticipated decline probably will be sufficient to place the total under the 197,608 cars assembled in September a year ago.

Manufacturers have launched sales and advertising campaigns in an effort to keep operations from tapering sharply. Indications are that these campaigns already are re-energizing retail-demand to some extent.

Ford is understood to be preparing to close the Rouge Plant for inventory purposes from Aug. 24 to Sept. 4. It is not established whether the shutdown will include the steel plant. It is expected that production of present models will be continued at least during September despite stories that operations on 1935 cars would be started when activities are resumed at Dearborn on Sept. 4. Ford has signed an order for expenditure of \$5,500,000 for equipment to double the power capacity at the Rouge Plant. This expansion is made necessary by enlargement of the steel plant. The order placed includes one 110,000-kw. generator, one high-pressure boiler and auxiliary equipment and one 15,000-kw. turbine generator unit. Together with the units installed during 1929 and 1930 the new equipment will give the Rouge Plant 2,200,000 lb. per hr. of high pressure steam for power generation. The new installation is a duplication with improvements of the one made four years ago. The generator installed then was designed for a steam temperature of 725 deg. F., but the new one is for 900 deg. The high-pressure

boilers of 1929-30 were designed for a steam temperature of 750 deg. and for a steam generating capacity of 700,000 lb. an hr. each, whereas the new boiler is for 900 deg. and 800,000 lb. per hr.

Tentative schedules set up by some automobile companies for September indicate confidence in continuation of business on a moderately good scale. Chevrolet is understood to be planning on making 55,000 units next month and a like number in October, thus carrying its assemblies on current models much further into the fall than it normally does. Chrysler with 42,000 units in prospect for August is expected to build about 35,000 cars in September. Volume buy-

ing of steel for 1935 cars will be delayed because most manufacturers will not know definitely the new sizes of steel until a late date. The feeling still exists locally that heavy purchases of steel will not be made by the automobile industry until about the middle of October. Meanwhile the tonnage placed will be of a fill-in character and will be for die try-outs. Chevrolet the past week gave probably its last steel releases for current model production, although some more orders may come through from the local gear and axle plant. The local steel plant is running four out of eight open-hearth furnaces. Hanna Furnace Corp. will blow out one of its Zug Island furnaces shortly for relining.

overnment subsidies or such were offered as an inducement to quit having pigs.

We have taken our losses while live pig raisers, no more deserving than the iron pig producers, receive fat checks for the work they don't do. But our troubles, as have been so often stated by that eminent Chairman of the United States Tariff Commission, Robert Lincoln O'Brien, are, as regards imported iron pigs, both illusory and transitory; that what aren't illusory are transitory, and what aren't transitory are illusory.

To suggest that the courage and foresight required in seeing to it that our sow quit producing might justly entitle us to liberal governmental recognition would be the height of immodesty on our part, but if, after reading the foregoing the idea should occur to you as being a good one, simply mail your check to the undersigned and you may be sure we shall sing your praises to high heaven for all time, even though we don't vote to support the present Administration in all other respects.

Very truly yours,

H. T. OUTWATER.

"Pigs is Pigs"

Hon. Henry A. Wallace,
Secretary of Agriculture,
Washington, D. C.

Dear Mr. Wallace:

On Thursday morning of this week I was astounded by the headlines in the Boston papers which blared forth the fact that 105 farmers in Middlesex County, Mass., were to receive an average of \$3,500 each for not raising pigs. One of them is to profit to the extent of \$20,000 in this non-pig-raising business.

Now the company which furnishes me my bread and butter and occasionally some roast pork has a million-dollar sow—some people call it a blast furnace—which was a prize pig producer up until about three years ago. Of course the pigs she gave birth to didn't make very good pork sausage or chops, but they did make excellent stoves on which to cook the edible kind.

This sow, which has now been farrowed since August, 1931, propagated at such a rate that every available inch of space on our property at Everett, Mass., was literally covered with pigs; in fact there were pigs everywhere. Consumers simply couldn't take care of the pork she produced, so what with the reduced ability of consumers to consume and the steadily increasing rate of importations of iron pigs from India and the Netherlands, we saw to it that she quit having pigs.

Had she continued producing pigs at an uninterrupted rate up to the present time, she would have become the mother of some 10,500,000 pigs between the day she quit and now. At the present price of pork these iron pigs would have been equivalent to approximately 1,050,000 of the live, squealing kind. Our pigs weren't raised on corn, but the mother did have an enormous appetite for iron ore, coke and limestone and, in dollars and cents, consumed more of these

commodities than the equivalent in corn necessary to raise pigs.

There was no incentive other than ordinary business acumen that decided she should cease such a prolific outpouring of young. Consumers simply couldn't eat the output. In addition to ours there are a great many other iron piggeries closed for the same reason. No bounties, Gov-

A Correction

In an article in THE IRON AGE of July 12, entitled "Foundries Accept Welding and Aim for New Goals," the author, Herbert R. Simonds, has evidently misquoted Major R. A. Bull, consulting metallurgist of Chicago.

Major Bull is purported to have said that "steel foundrymen frequently supply cast steel parts which are to be joined to wrought iron parts for fusion welding, where such composite

construction produces the most economical complete unit."

Major Bull writes that he has never stated nor does he believe that steel foundrymen often supply castings that are to be joined to wrought iron parts for fusion welding and that he has never heard of steel castings being so used. His original statement was to the effect that "steel foundrymen frequently make castings that are to be connected to wrought parts by fusion fabrication." The wrought parts referred to by Doctor Bull are parts made from rolled or forged steel.

Metal-Working Machinery Produced In 1933

THE statement below, released by the Bureau of the Census, gives statistics on production of metal-working machinery in 1933, with comparative figures for 1931. The figures for 1933, which are preliminary and subject to revision, were compiled from data collected at the Biennial Census of Manufactures taken in 1934.

Scrap Lethargic At Detroit

DETROIT, Aug. 21.—The local scrap market remains in a state of lethargy, with slight hope of a revival of buying for at least another 30 days. Meanwhile prices are nominally quoted at the levels which prevailed a week ago. With steel mills continuing to hold up water shipments of scrap, the accumulated tonnage for the dock at Ecorse is reported to be 80,000 to 90,000 tons.

Metal-Working Machinery—Production by Class and Value: 1933 and 1931

Class	1933	1931
Metal-working machinery (other than machine tools), total.....	\$13,197,141	\$36,294,221
Rod and wire-working machinery.....	230,234	1,887,847
Rolling-mill machinery.....	4,386,001	17,567,791
Sheet metal-working machinery.....	7,117,310	13,580,271
Wire-drawing machinery.....	345,893	411,062
Other metal-working machinery.....	1,117,703	2,847,250

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SUMMARY OF THIS WEEK'S BUSINESS

Steel Production Reverts to Early July Level

Ingot Output Recedes From 22 to 21 Per Cent—Prices Being Reaffirmed For the Fourth Quarter—Large Scrap Purchase

WITH the last month of the third quarter approaching, no signs of an upturn in iron and steel business have appeared. Widespread concern over Federal policies, particularly as they relate to money and labor, undoubtedly has played a large part in holding back industrial enterprise, with the result that consumer stocks of material accumulated in June are lasting longer than had been expected. Nevertheless it is difficult to believe that consumption of iron and steel has fallen as sharply as production, and it is therefore believed that September, which will mark the end of the vacation season, will usher in some measure of improvement in buying.

AUTOMOTIVE releases of sheets and strips have increased moderately at Cleveland and Chicago, where ingot production has risen three points to 13 per cent and one point to 30 per cent respectively. But buying by the motor car industry is developing much more slowly than had originally been expected. It is becoming increasingly clear that automobile makers are in no hurry to bring out new models. The January exhibition in New York is no longer a national affair sponsored by the automobile chamber of commerce and hence has lost its significance as a final date for getting new lines into production. Nervousness over the future course of the national Administration and uncertainty as to what the impending renewal of the automobile code will mean in terms of costs are also factors conducive to caution.

Aside from the slight upturn in automobile takings of steel, the trend of bookings has been toward lower levels. Ingot production has declined three points to 11 per cent at Pittsburgh, four points to 18 per cent in the Valleys and three points to 24 per cent in the Wheeling district, remaining unchanged at other producing centers. The national average has dropped from 22 to 21 per cent of capacity, the lowest rate of the year, reached only once before, in the first week of July.

NO marked rebound is in immediate prospect. Heavy tonnage business from the railroads is being completed and new public works projects are likely to be slow in reaching the contracting stage. The principal

dependence of the mills for some time to come, it is believed, will be business in the lighter-rolled products.

Sufficient volume to compensate for late reductions in prices has not been forthcoming and the market situation is not such as to permit fresh advances. Prices thus far filed for fourth quarter on both finished steel and pig iron indicate that present quotations will be reaffirmed. At those levels, however, a continued dearth of tonnage is likely to draw attention to the industry's cost burden, which has been materially increased by wage advances under the code.

SEASONAL influences have become apparent among snow fence manufacturers, who are now getting into production for next winter's requirements. In general, however, wire products are quiet, reflecting the effects of the drought on agricultural buying.

Structural steel awards total 11,400 tons against 15,600 tons a week ago. New projects of 13,900 tons compare with 13,200 tons in the previous week and 7600 tons two weeks ago. Sheet steel piling awards of 4375 tons include 4000 tons for the spillway of the Bonneville dam. Prospective plate work totals 12,300 tons. The Standard Oil Co. of California will place storage tanks requiring about 5000 tons of plates and has purchased 2500 tons of 12-in. steel pipe for a new pipe line. The city of New York has bought 5100 tons of contact rails and will take bids Sept. 5 on a Hudson River pier shed requiring 4500 tons of structural steel.

THE scrap market still has a weak undertone but has suffered no further major declines, THE IRON AGE composite for heavy melting steel remaining unchanged at \$10.17 a gross ton, the low to date for the year. In both the scrap trade and the pig iron market there are accumulating evidences that there has been some buying of material, as yet by no means general, as a hedge against possible inflation. Export demand for scrap is active at seaboard points. An eastern dealer with a large foreign trade has purchased 70,000 tons of old material from a southeastern railroad.

THE IRON AGE composite prices for pig iron and finished steel are unchanged at \$17.90 a gross ton and 2.124c. a lb. respectively.

▲ ▲ ▲ A Comparison of Prices ▲ ▲ ▲

**Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics**

Pig Iron

Aug. 21, Aug. 14, July 24, Aug. 22,
1934 1934 1934 1933

	Per Gross Ton:	No. 2 fdy., Philadelphia	\$20.26	\$20.26	\$20.26	\$17.34
No. 2, Valley furnace		18.50	18.50	18.50	16.50	
No. 2 Southern, Cin'ti		19.13	19.13	17.73		
No. 2, Birmingham†		14.50	14.50	14.50	13.00	
No. 2 foundry, Chicago*		18.50	18.50	18.50	17.00	
Basic, del'd eastern Pa		19.76	19.76	19.76	17.09	
Basic, Valley furnace		18.00	18.00	18.00	16.00	
Valley Bessemer, del'd P'gh.		20.76	20.76	20.76	18.89	
Malleable, Chicago*		18.50	18.50	18.50	17.00	
Malleable, Valley		18.50	18.50	18.50	16.50	
L. S. charcoal, Chicago		24.04	24.04	24.04	23.17	
Ferromanganese, seab'd car-lots		85.00	85.00	85.00	82.00	

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Finished Steel

Aug. 21, Aug. 14, July 24, Aug. 22,
1934 1934 1934 1933

Per Lb.:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.25
Hot-rolled annealed sheets, No. 24, Gary	2.50	2.50	2.55	2.35
Sheets, galv., No. 24, P'gh.	3.10	3.10	3.10	2.85
Sheets, galv., No. 24, Gary	3.20	3.20	3.20	2.95
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	1.65
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	1.75
Wire nails, Pittsburgh	2.60	2.60	2.60	2.10
Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.15
Plain wire, Pittsburgh	2.30	2.30	2.30	2.10
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.15
Barbed wire, galv., Chicago dist. mill	3.00	3.00	3.00	2.60
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	2.65
Tin plate, 100 lb. box, P'gh.	\$5.25	\$5.25	\$5.25	\$4.25

Scrap

Per Gross Ton:

Heavy melting steel, P'gh.	\$11.25	\$11.25	\$11.75	\$13.75
Heavy melting steel, Phila.	10.00	10.00	10.00	12.00
Heavy melting steel, Ch'go.	9.25	9.25	9.50	10.25
Carwheels, Chicago	9.50	9.50	9.50	10.50
Carwheels, Philadelphia	11.25	11.25	12.50	12.75
No. 1 cast, Pittsburgh	11.75	12.25	12.25	11.75
No. 1 cast, Philadelphia	11.75	11.75	11.75	12.50
No. 1 cast, Ch'go (net ton)	8.00	8.00	8.50	10.50
No. 1 RR. wrot., Phila.	11.25	11.25	11.25	12.00
No. 1 RR. wrot., Ch'go (net)	7.25	7.25	7.25	9.00

Rails, Billets, etc.

Per Gross Ton:

Rails, heavy, at mill	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2	\$40.00
Light rails, Pittsburgh	35.00	35.00	35.00	30.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	26.00
Sheet bars, Pittsburgh	28.00	28.00	28.00	26.00
Slabs, Pittsburgh	27.00	27.00	27.00	26.00
Forging billets, Pittsburgh	32.00	32.00	32.00	31.00
Wire rods, Pittsburgh	38.00	38.00	38.00	35.00
Cents	Cents	Cents	Cents	
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.60

Finished Steel

Per Lb.:

	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.80	1.80	1.80	1.60
Bars, Chicago	1.85	1.85	1.85	1.70
Bars, Cleveland	1.85	1.85	1.85	1.65
Bars, New York	2.13	2.13	2.13	1.95
Plates, Pittsburgh	1.80	1.80	1.80	1.60
Plates, Chicago	1.85	1.85	1.85	1.70
Plates, New York	2.08	2.08	2.08	1.898
Structural shapes, P'gh	1.80	1.80	1.80	1.60
Structural shapes, Chicago	1.85	1.85	1.85	1.70
Structural shapes, New York	2.05 1/4	2.05 1/4	2.05 1/4	1.86775
Cold-finished bars, P'gh	2.10	2.10	2.10	1.70
Hot-rolled strips, P'gh	1.85	1.85	1.85	1.65
Cold-rolled strips, P'gh	2.60	2.60	2.60	2.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables. †Blue Eagle copper.

Metals

Per Lb. to Large Buyers:

	Cents	Cents	Cents	Cents
Electrolytic copper, refinery‡	8.75	8.75	8.75	9.00
Lake copper, New York‡	9.12 1/2	9.12 1/2	9.12 1/2	8.75
Tin (Straits), New York	52.10	52.90	52.15	44.12 1/2
Zinc, East St. Louis	4.30	4.30	4.30	4.85
Zinc, New York	4.65	4.65	4.65	5.22
Lead, St. Louis	3.60	3.60	3.70	4.35
Lead, New York	3.75	3.75	3.85	4.50
Antimony (Asiatic), N. Y.	8.62 1/2	8.50	8.12 1/2	8.67 1/2

▲ ▲ ▲ The Iron Age Composite Prices ▲ ▲ ▲

Finished Steel

Aug. 21, 1934
One week ago
One month ago
One year ago

2.124c. a Lb.

2.124c.

2.124c.

1.959c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.

Pig Iron

\$17.90 a Gross Ton
17.90
17.90
15.94

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap

\$10.17 a Gross Ton
10.17
10.42
12.00

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

Operations Are Off Three Points at Pittsburgh



Ingot Rate Also Lower in Wheeling District and Valleys—Replenishment Buying Fails to Develop in Volume

PITTSBURGH, Aug. 21.—At the halfway mark in third quarter, steel buying has failed to fulfill the most conservative expectations of the local steel industry. The extreme nervousness over Federal policies, particularly those concerning labor problems, has undoubtedly sharply reduced steel orders, but it is difficult to believe that consumption of steel has fallen as sharply as production.

Open-hearth schedules in the current week, however, are believed to offer a fair gage of the general trend in steel requirements. In the Pittsburgh district, ingot output is down three points to 11 per cent, the second lowest week reported this year. Production in the Valleys and nearby northern Ohio mills has fallen four points to 18 per cent. Activity in the Wheeling district has dropped three points to 24 per cent. The further drop in raw steel output is perhaps clear evidence of the failure of expected buying to appear from miscellaneous sources and from the automotive industry.

There is no doubting the fact that steel shipments since the beginning of third quarter have been in excess of production, inasmuch as withdrawals have been largely from stocks that had been replenished during the July lull. Evidences of replenishment buying appearing in the past two weeks have not increased. Some finished steel products are commanding a wider interest, but aggregate daily bookings are irregular as to tonnage.

Finishing mills are consequently operating intermittently. Tin plate mills continue to lead all departments with an average of 50 per cent. Sheet mill output is suffering one of its worst weekly records, at only 17 per cent. Strip mills are faring slightly better. Seamless tube mills are erratic, with some units at 30 per cent and others inactive. The local rail mill is staggering production on rails and sheet bars. Only 13 blast furnaces in this district are active.

The Pittsburgh Flood Commission is planning eight dam reservoirs, the first of which will come up for bids on about Oct. 15. A fair demand for steel reinforcing is expected to develop if these projects are carried through.

Some steel prices for fourth quarter are being filed this week, to become quotable on Sept. 1. No important revisions are thus far in contemplation.

Pig Iron

Activity in this market is still depressed. Reduced summer melts at most foundries in this district have eaten sparingly into stocks, and there seems to be little likelihood of any general buying this quarter. Orders are being meted out only to meet imperative requirements. Steel-making grades are not active, nor is there any evidence of early interest on the part of non-integrated mills.

Semi-Finished Steel

Sheet bars have not relinquished the lead in this market, shipments being fairly well maintained to detached tin plate mills. The movement of sheet bars to non-integrated sheet mills is somewhat slower. Skelp is enjoying an improved demand, but practically all other semi-finished grades are marking time.

Bolts, Nuts and Rivets

This market has remained bare of feature developments in the past week. Specifications continue to be placed at a much slower pace than had been expected. Although early business prospects are not definable, producers believe a better flow of releases will appear in September.

Rails and Track Accessories

Backlogs of rails and track accessories at the close of August will probably be at a low point for the year. It does not appear likely that any further injection of purchasing power will be afforded by the Government this year. Even in the event that some Federal funds were thus proffered, it is considered questionable whether many carriers could meet the characteristically stringent collateral requirements. The outlook for any major buying in the remainder of the year is thus very bleak.

Bars

Demand, though not on the upgrade, is holding its own. Aggregate business in the current month in some cases is running 40 per cent ahead of that for July. Forward interest is

very restricted. The uncertainty of plans in the automotive industry is more or less obscuring the outlook for early bar tonnage. The fact that motor car makers have been able to maintain recent production schedules on 1934 models without replenishment of steel stocks is considered unusual by some bar producers.

Reinforcing Bars

Bids are expected to be requested about Oct. 15 on 875 tons for the Tygart Valley reservoir dam near Grafton, W. Va., the first of a series of eight reservoirs proposed by the Pittsburgh Flood Commission. The Government post office construction program will not fatten reinforcing steel mill order books to any great extent, each postal edifice requiring an average of only 15 tons of steel. Recent lettings of several Pennsylvania road jobs have accounted for moderate tonnage to local mills.

Cold Finished Steel Bars

Producers are now looking forward to September for improved demand from the automotive industry. The past week was very dull, with incoming tonnage reflecting no increase over the preceding week's business. Expected replenishment of jobber stocks has not made definite headway.

Shapes and Plates

Both structural inquiries and awards are restricted. The feature contract for the week covers 4700 tons to the American Bridge Co. for the Orleans Street viaduct at Baltimore, the steel to be fabricated in this district. The American Bridge Co. also will install about 300 tons of wire in the Tri-Borough piers at New York. A city incinerator at Pittsburgh will require 300 tons.

The plate market here is extremely quiet. River barge work is inactive, and calls for tank construction and new railroad work are few.

Wire Products

Snow fence manufacturers, starting on their seasonal engagements, are now factors in this market. Bolt makers also have increased their releases. Wire mesh for road construction is facing the seasonal slump in the fall, except in certain parts of the South where road work will not be interrupted during the winter. Some distributors, who have not signed jobber agreements, have disturbed the resale market to some extent by offering wire products at below the code levels, in force under jobber agreements. The lower-priced material, however, is believed to represent purchases by distributors prior to the general price advances in second quarter.

Tubular Products

The Standard Oil Co. of California has placed about 2400 tons of seamless pipe, 12 $\frac{1}{2}$ to 22 in. O. D., with two producers in this district. It is re-

ported that this tonnage will cover the oil company's requirements of new pipe in connection with its proposed 108-mile oil line in the San Joaquin Valley in California. A slight improvement in rolling schedules is evident at some mills in the Pittsburgh district. Small-lot orders for commercial boiler and locomotive tubes are more frequent.

Sheets

Despite the absence of major sheet buying for almost two months, consumers continue to show little interest in further commitments. The prolonged absence of business has driven sheet mill operations this week to below 20 per cent, and, unless incoming business improves, further shading of schedules may be necessary, particularly with backlogs generally at the vanishing point. Prices for fourth quarter are expected to be filed for quoting on Sept. 1. It is reported that no changes in the base prices will be made, at least for application early in the coming quarter.

Tin Plate

Operations this week will average 50 per cent. Toward the close of last week several producers were forced to step up schedules to meet an unusual demand from miscellaneous sources, and for export shipment. At the present time can companies appear generally to have rounded out stocks, and predictions are that a decline may be expected. The spirited demand from the Government-sponsored slaughtering program has largely disappeared. Any further support from seasonal packs is expected from the tomato crop, which is very satisfactory this season. Filing of prices for fourth quarter is not expected to disclose any changes in base quotations for tin plate or tin mill black plate.

Strip Steel

Shipments in August are running about 20 per cent ahead of those in July. Current volume, however, is far from normal. Some buying by motor car makers of new model sizes of strip is expected at least within three weeks. Currently very little tonnage is moving in that direction, most automobile manufacturers appearing to be well covered against production on current models. Miscellaneous business offers no definite gage of trends in strip consumption.

Coal and Coke

The Chateaugay Ore & Iron Co., which has inquired for its fourth quarter requirements of coke, is expected to purchase by-product coke, the price of which is not governed by code. Production of Connellsburg beehive coke is considerably depressed, in keeping with a negligible consumer demand. Surplus of slack coal is expanding in the face of an unusually sluggish movement to the Lakes. The whole fuel market appears to be un-

settled by regional differences over the bituminous code.

Scrap

Consumer interest in scrap again appears to have evaporated completely. An independent mill in the Wheeling district that had been buying No. 1 scrap at about \$11.50, delivered, has withdrawn from the market. In the absence of trading, No. 1 heavy melting steel is largely nominal and unchanged at \$11 to \$11.50. After long resisting the downtrend in other scrap prices, No. 1 cast dropped 50c. a ton to \$11.50 to \$12. Railroad specialties are slightly firmer at \$13.50 to \$14.

International Nickel Duplicates First Quarter

INTERNATIONAL NICKEL COMPANY OF CANADA, LTD., practically duplicated in the second quarter of this year the net profit made in the first three months, according to the quarterly statement mailed to stockholders last night.

The exact figure for the second quarter was \$4,963,366.48, as compared with \$5,049,275.91 in the preceding period. After provision for quarterly dividend on the preferred stock, this profit was therefore again equivalent to the 31 cents a share earned on the common stock in the first quarter.

Net profit for the first six months of 1934 was \$10,012,642.39, as compared with \$1,862,888.51 for the first half of 1933.

The balance sheet reflects purchase of additional shares of Ontario Refining Company, Limited, and further reduction in the outstanding debenture stock of British subsidiaries, the two transactions involving a total of \$5,290,132.04. Despite these outlays and the payment of two dividends on the common stock, aggregating \$2,915,633.80, cash on June 30 was \$15,961,243.92 as against \$14,085,610.64 on Dec. 31, 1933.

A net debit of \$401,973.97 resulting from exchange adjustments made during the first six months of 1934, was carried to exchange reserve and was not reflected in net profit. The balance in exchange reserve was \$1,424,849.72 on June 30.

In an accompanying letter to stockholders, Robert C. Stanley, president, points out that the company has developed processes and refineries to recover metals other than the nickel content of the ore. He lists these by-products in the following order of importance: Copper, the platinum metals (platinum, palladium, iridium, ruthenium and rhodium), gold, silver, selenium and tellurium. Continuing, he writes:

"Second only to Soviet Russia in the

production of platinum, Canada is now the world's largest producer of palladium. Discovered and named by Wollaston in 1804, this member of the platinum group has been until recently little known outside the electrical and dental fields. Now, largely through your company's development and research activities, palladium's fine color and its true resistance to atmospheric tarnish (properties which it shares with platinum) have become recognized, and the metal is finding new places in jewelry and the decorative arts."

* * *

GRANITE CITY STEEL CO. reports net profit of \$200,245 for the six months ended June 30 last, equal to 78 cents a share, against \$30,754 or 12 cents a share in first half of 1933.

* * *

McQUAY-NORRIS MFG. CO., St. Louis, reports net earnings of \$200,511 for the six months ended June 30 last, equal to \$1.75 a share, compared with \$211,690 or \$1.85 for the same period a year ago. "Lower earnings were caused almost wholly by the fact that we developed during this period (first half of 1934) a new piston ring, which was placed on the market the latter part of June," a letter to stockholders states. "Development and promotional costs were charged currently to expense without the corresponding advantage in sales. In spite of the current business recession sales of our new rings have been exceptionally heavy during July and to date in August, so that it is estimated that for the first eight months of 1934 profits will be at least equal to the corresponding eight months of 1933."

* * *

AMERICAN LOCOMOTIVE CO. reports a loss for the first six months of 1934, after deducting depreciation of \$278,192.66, Federal taxes of \$66,510.00 and all other charges, of \$1,288,966.61. This result compares with a loss of \$1,362,341.63 for the corresponding six months of 1933.

The unfilled orders on the books at July 1, 1934, amounted to \$7,642,149, compared with \$3,500,782 at January 1, 1934, and \$2,947,111 at July 1, 1933. During the first half of 1934 the company received orders for 42 locomotives, 5 of which were shipped, together with the shipment of two locomotives ordered during the previous year, making a total of seven locomotives shipped during the period. The 37 locomotives remaining on order at July 1, 1934, are expected to be completed and shipped during the last half of the year, thus favorably affecting the earnings for that period.

Chicago Production Rises One Point to 30 Per Cent



But New Business Remains Light and the Fall Outlook Is Uncertain—Steel Prices Being Reaffirmed for Fourth Quarter

CHICAGO, Aug. 21.—Producers of finished steel are filing prices for fourth quarter deliveries and so far as can be ascertained price levels will remain unchanged. It is evident that most producers want to avoid changes at this time, though the market is not without disturbances such as in wire nails and reinforcing bars. Wavering of nail prices thus far has been confined to jobbers' quotations, but producers are fully aware of the possible ultimate consequences of such a situation. Reinforcing bars have steadied recently, but the market is devoid of tonnages that would give prices a real test.

The iron and steel market as a whole is rather drab. Ingot output is up one point to 30 per cent of capacity, following a moderate increase in activity at one mill. New orders are extremely light and current specifications do not point to betterment in the near future. The factor most disturbing to mills is that the best they can see for the early fall is support from the lighter products, the outlook for substantial tonnages of the heavy products being unfavorable. Prospects for railroad and structural business, for example, are not promising. On the other hand, round tonnages of hot-rolled strip for automobile frames and sheets for bodies are now under negotiation.

Cooler weather has come to the plains country and in some sections rains have fallen. In general, crops cannot be benefited at this late date, but pastures are in better condition and stock raisers have found relief for the time being, although handicapped by lack of stored feed for the winter months.

Pig Iron

Shipments are dropping after two weeks, in which they averaged better than during the early part of July. Apparently users recently bought certain grades to balance their stocks. Their inventories are known to be heavy as a result of June shipments. There is some talk among foundrymen of additional purchases in excess of needs as a hedge against the possibility of inflation. Meanwhile sales remain light and on a spot basis.

Cast Iron Pipe

Spottiness still characterizes this market, and most orders are of such size that they can readily be shipped from stock. However, considerably more activity is promised for September when it seems certain that much PWA work will be released. The only recent sizable order is for 10,000 ft. of 14- and 16-in. pipe placed by Huron, S. D. Prices remain on a firm basis.

Reinforcing Bars

Activity is confined to awards of 15 to 20 tons. Inquiries are not very promising and bar fabricators do not envisage a lively fall in Chicago, although they believe that orders from surrounding territory will reach a fair total. Illinois highway work, which has been slow this summer, promises to expand this fall. Bids on 200 tons of paving and bridge work will be opened Aug. 28. There is some fear that large tonnages might break present price levels.

Hot-Rolled Strips

A substantial rebound has taken place in this market and it is evident that automobile frame makers are busier on current orders. Part of the improvement in mill releases comes from the fact that stocks in the hands of users have been depleted faster than earlier estimates had indicated.

Sheets

The general run of business shows no change, but there is an excellent prospect that automobile body plants may soon enter the market in a very substantial way. Steel companies are starting to refile present prices for four quarter deliveries.

Wire Products

Country dealers continue to order only bare requirements. The drought has hampered the movement of stocks in the hands of dealers and jobbers, and few fill-in orders are reaching mills. Nevertheless, sellers believe that present demand marks the low point and that business will revive in the early fall. No major moves have been made in the nail fight between jobbers and mail order houses. Jobbers are inclined to blame some do-

mestic producers for the trouble, contending that mail order houses away from seaboard are distributing the domestic product and that foreign-made nails can move at a profit only within limited territory near ports of entry.

Plates

The 2000-ton tank inquiry mentioned two weeks ago has been satisfied in part, 1300 tons having been placed in the East. It has not been determined if the remaining 700 tons is still to be purchased. Market support from the railroads is extremely limited and scattered tank projects, usually for municipalities, barely keep fabricating shops open. Present prices are being filed for fourth quarter deliveries.

Rails and Track Supplies

In the absence of new orders mills are stretching old business as far as possible and will probably continue in operation through the first week in September. An occasional carload of light rails is being sold.

Bars

This product furnishes more and more evidence that the lighter steel products are the backbone of the market. In fact, most producers frankly admit that they do not see much ahead in heavy products and that most of the fall improvement will be in the bar mills and other units making the lighter products. Tractor manufacturers are taking more steel and tonnage from agricultural implement makers is more stable. There is less certainty in the way in which miscellaneous users state requirements, but their demand in the aggregate varies little from week to week.

Structural Material

Awards, at 1300 tons, and fresh inquiries, at 4200 tons, make a poor showing in view of the structural shop capacity available in this district. The Milwaukee road is in the market for 600 tons for a bridge, and both the Chicago & Eastern Illinois and the Illinois Central have placed small orders for beam spans. The Burlington and the Baltimore & Ohio have placed small bridge orders. The labor situation at Milwaukee is unchanged, two shops being closed and two remaining open.

Scrap

The scrap market is extremely dull and prices lean toward the weak side. Although mills are receiving scrap faster than they are using it, they are not unwilling to buy additional tonnages at present prices. However, dealers do not look upon these sales as satisfactory, and as a consequence practically no tonnages are being offered. The Santa Fe has listed 7000 tons, but some believe the road is merely trying to feel out the market. A few carloads of scrap have been taken by foundries.

Steel Market Still Depressed at New York



New Pier Shed Will Require 4500 Tons—
Export Inquiries for Tanks Call for 6000
Tons—Dealer Buys 70,000 Tons of Scrap

NEW YORK, Aug. 21.—Steel bookings are still unusually light, although replenishment orders are somewhat more numerous, especially in the case of sheets and strip steel. A few additional releases of heavy-gage tin plate for the Government's cattle slaughtering program have been made, but further business in this category will probably be limited to the purchase of fill-in requirements as needs arise at the various branch plants of the can companies.

The Department of Docks, New York, will take bids Sept. 5 on a new pier shed at the foot of Canal Street, Hudson River, which will require 4500 tons of structural steel. The Board of Transportation, New York, has placed 5100 tons of contact rails for the Independent subway with the Bethlehem Steel Co. Few new public projects are now before the trade, but a large number have recently been authorized and will probably reach the contracting stage in about six months. Among them are a considerable number of Federal-aid jobs in Vermont, one of the last States to avail itself of Government financial assistance.

So far as can be determined there were no deviations from code prices in connection with the bids on naval vessels taken last week. The real test, of course, will come when the Government takes direct bids on steel for vessels to be built in its own yards. An incidental item in connection with recent Navy Department purchases but one which will run into a sizable sum is the placing of 6500 stainless steel water pitchers, requiring 7 to 8 tons of material.

A complicating factor affecting tin plate prices is the strength of tin, which is under international cartel control, and the possibility that it may rise still higher if the dollar gives further ground as the result of the Government's monetary experiments.

Export business in steel is receiving more attention in view of the decline in domestic orders. The Standard Oil Co. of New Jersey is in the market for oil storage tanks for Sumatra, requiring 1000 tons of plates. An inquiry from the Royal Dutch Shell interests for storage

tanks on the Island of Aruba, calling for 5000 tons, is still open.

Pig Iron

Sales last week totaled about 650 tons, as compared with 800 tons in the preceding week and 1100 tons two weeks earlier. Several New Jersey melters are inquiring for an aggregate of around 200 tons, but otherwise the market is totally inactive and featureless.

Reinforcing Steel

The delay in Public Works appropriations for this territory is being reflected in a considerably reduced demand for reinforcing steel. Pending projects include about 500 tons for the Tri-Borough bridge and 200 tons for the New York Central Manhattan

improvements which will be let on Aug. 28. Awards last week include 570 tons of bars to Igoe Brothers for sewer constructions in Brooklyn and Queens.

Scrap

Moderate quantities of No. 1 steel are being loaded at \$8 a ton, barge, for Japanese delivery, and No. 2 is still being purchased at \$6.50 against old Italian and Polish contracts. The export market can be considered firm despite the slight soft undertone. Japan is not as actively interested in fresh commitments inasmuch as steel operations there have declined considerably. However, Europe continues to be a good market, although buyers are mostly on the lookout for bargains. Domestically the scrap market is unchanged and somewhat discouraging. Bethlehem shows no sign of returning to the market, and other eastern Pennsylvania melters are interested in carlot quantities only. It is the opinion of brokers here that steel operations must go beyond 30 per cent before the scrap business will show any life. About the biggest broker purchase within many months is that of Luria Brothers & Co. from a Southeastern railroad. A number of obsolete cars were acquired last week and, after dismantling, about 70,000 tons of carwheels, axles and No. 1 steel will be available. The buying price was close to the market, and the material will probably be shipped abroad.

Pipe and Piling Awards Are Features on Coast

SAN FRANCISCO, Aug. 20.—The construction of a 108-mile oil line between Rio Bravo and Estero Bay, Cal., by the Standard Oil Co. of California, has caused wide attention due largely to the erroneous impression that the line was to be entirely of new pipe. To cover the 16 miles of new pipe required the company has purchased approximately 2500 tons of 12-in. steel pipe from two undisclosed bidders. The report that Columbia Steel Co. was awarded a portion of the tonnage has not been confirmed. In connection with this project bids have been taken for 12 storage tanks to be located at either end of the line. With alternatives involved the award will range from 2500 to 4800 tons of plates. Bids are to be taken later by the Standard Oil Co. for tanks at Richmond, Cal., which will require approximately 1500 tons of plates.

Tonnages placed for major projects made the week's awards the largest of the present quarter. At Portland, Ore., the Columbia Steel Co. booked 4000 tons of steel sheet piling for the Bonneville spillway dam. Awards on three State bridges in Oregon, on

which the general contracts had been pending for several months, were placed, and 1075 tons of reinforcing bars was let to Pacific Coast Steel Corp., 850 tons to Soule Steel Co. and 325 tons to Mercer Steel Co. Poole & McGonigle were awarded 1040 tons of structural steel on two of the bridges. At Stockton, Cal., 750 tons of rail reinforcing steel for a wharf and transit shed was awarded to Simmons Co. of California.

Among new inquiries listed during the week one of 940 tons of cast iron pipe for Phoenix, Ariz., was outstanding. An office building in Los Angeles will require 600 tons of structural steel.

Although awards have been above average and a greater number of projects calling for minor tonnages are pending, mill production remains at a seasonal minimum and prices are unchanged. Warehouse business has shown a slight increase.

Bureau of Reclamation, Denver, Colo., has awarded 224,000 square feet of electrically welded fabric for Boulder Dam to Sheffield Steel Co. and Judson Mfg. Co. The award was made under Spec. 23,208-A, which included 5500 tons of reinforcing bars, also placed with these two bidders.

Naval Awards Awaited In Philadelphia Territory



Operations Barely Sustained at 22 Per Cent of Capacity—Finished Steel Purchases Fail to Show Improvement

PHILADELPHIA, Aug. 21.—With demand for finished steel products showing no improvement, mills in this district are principally concerned with the awards of 24 naval vessels on which bids were opened last week in Washington. While no definite information is yet available, the low bidders are announced elsewhere in this issue, and it is indicated that a fair proportion of the 41,000 tons of steel required may come to Philadelphia district mills. This business would not affect rolling schedules until late in the fourth quarter, but would provide backlog which have been seriously depleted by code regulations.

Shipments to the railroads against orders placed earlier in the year will be cleaned up in the next 10 days and little additional tonnage from this source is expected over the remainder of the year. The Pennsylvania is said to be considering a car-building and repair program to begin as soon as the work now under way is completed, but no definite decision has been reached. The freight cars this carrier is constructing in its own shops will be completed during October and electrification work will be largely finished by the end of the year. New work undertaken in the fall would thus be largely a means of providing employment during the winter months.

Steel ingot production in the Philadelphia district is holding its own at 22 per cent of capacity, but curtailment will be necessary after Labor Day unless tonnage appears to take the place of railroad orders which will be completed Aug. 31. An independent open-hearth furnace has been put on at a plant which had been inactive for more than a month, but this gain has been offset elsewhere. It is significant that a maker of structural shapes is relatively the most active in the district from a steel making standpoint.

Pig Iron

Orders are still confined to carload lots, but foundry stocks have been reduced somewhat and fear of inflation has forced a few buyers to begin considering inventory building. The larger cast iron pipe makers in the district have maintained their produc-

tion fairly well during the summer, but no definite improvement is in sight. Practically all of their tonnage is for public works jobs and no foreign iron can be used. Pig iron producers in this territory today reaffirmed current prices for fourth quarter.

Bars, Plates and Shapes

The structural steel market is relatively the most active of all finished steel outlets. Awards are not large, but tonnage is being placed regularly and fabricators' backlog are not being depleted. New bids will be taken Sept. 11 on a junior high school at Reading, Pa., which will require 500 tons. Reinforcing bar demand is also fairly well maintained, but there is little movement of merchant steel. The plate market is featured by the

Another Blast Furnace Banked in South

BIRMINGHAM, Aug. 21.—Most of the large consumers are still amply stocked for their current requirements in steel and pig iron, but some spot business is developing from others that did not load up heavily in the second quarter.

The number of active blast furnaces for the district was reduced to five last week when Sloss-Sheffield banked its No. 2 furnace. This is a loss of two in two weeks, the Tennessee company having banked Fairfield No. 6.

Six open-hearts are being worked, four at Fairfield and two at Alabama City. No change was made last week and none is planned for this week.

After operating its mills for the past six weeks on a very irregular and restricted basis, Gulf States Steel Co., on Monday, returned to a broader schedule. Some of the departments had not been worked since July 1. At a meeting of Gulf States employees last Friday, more than 1000 promised to prevent agitation of any kind in the plant and pledged their full cooperation.

Ingalls Iron Works has booked ap-

Navy building program, on which bids were taken in Washington last week. Awards are not expected until early in September. Eastern Pennsylvania mills will likely share heavily in the tonnage. About 41,000 tons of shapes and plates will be needed.

Sheets

With automobile body plants still out of the market, demand for sheet steel products continues very light. Radio makers have not yet begun to place substantial orders, but two or three of them are expected in the market in the near future. Demand from other sources is meager. Warehouses are well stocked and will not likely do much buying until the fourth quarter.

Imports

The following iron and steel imports were received here last week: 1529 tons of pig iron from British India, 603 tons of iron ore from Spain, and 38 tons of structural shapes, 17 tons of steel bands and 13 tons of steel bars from Belgium.

Scrap

No sizable sales into consumption have been reported in the last week and quotations are generally unchanged. The export movement continues in this district and is preventing distress material from coming out. With open-hearth operations continuing at such a low rate, no significant buying is expected in the near future.

proximately 1000 tons from the port commission at Stockton, Cal., for the construction of a wharf and warehouses.

Last week there were threats of strikes at the plants of the Stockham Pipe & Fittings Co. and the Continental Gin Co. but efforts are now being made to adjust the complaints.

Trackwork Production Down in July

TRACKWORK shipments for July of this year amounted to 5226 net tons, according to the American Iron and Steel Institute. This is the smallest month's output since the first quarter. The total for the second quarter of 1934, however, 18,080 tons, is well ahead of any similar period since the first quarter of 1931.

The O. K. Tool Co., Shelton, Conn., manufacturer of holders and tools for lathes, planers, shapers and boring mills and inserted-tooth milling cutters, has become a company member of the American Standards Association.

Scrap Off 25c a Ton At Cincinnati

CINCINNATI, Aug. 21.—Pig iron consumption is low, and many of the large melters are carrying sufficient metal to care for needs through this month and possibly next. With relatively no new buying this quarter, shipments are noticeably below last quarter. The highest melt is among stove foundries. Automotive melters are not doing a great deal.

Steel

While sheet demand continues to cover a wide field of consumption, tonnage totals do not warrant operations in excess of 25 per cent of capacity. Automotive consumption is slow, in keeping with the general trend. The leading district interest is operating its various units intermittently except at Middletown, where rolling schedules on a reduced basis have been maintained.

Warehouse Business

Steel jobbers report demand holding to the July level, but business is yielding to seasonal influences and may cause the month's total to fall below that of last month unless anticipated construction activity materializes.

Scrap

Weakness of scrap prices is stimulating occasional speculation, but otherwise purchases are negligible. In keeping with lower quotations in other districts, local dealers have reduced prices 25c. on all items.

Resale Nail Market Weak at St. Louis

ST. LOUIS, Aug. 21.—Buying of finished iron and steel is said to be at the lowest point that it has been in this section for some time. Structural projects are few, although there is hope for considerable business in PWA plans. Wire products are reported to be moving slowly. Bale tie demand was heavy for a time, but the season is about at an end. Weakness in the resale market for nails is reported as a result of the activities of Chicago distributors in this market. Sheets are dull.

All factors in the scrap trade in St. Louis continue to mark time. Mills continue to draw on their reserve stocks, which are said to be becoming low, but a better market is expected before the middle of September. Dealers have cut the price of railroad springs 50c. a ton to correspond with recent sales to mills. Otherwise the market is nominally unchanged. The Missouri Pacific sold 100 cars of scrap during the week, most of it going to Kansas City interests. The Gulf Coast Lines have pending a list of 1500 tons,

which it is expected will be sold for export.

The melt of pig iron during July and August has not been maintained at the same rate as prevailed during June, and makers expect that there will be some carry-over of stocks in hands of foundries in the last quarter. The extent of the carry-over is not known at this time. In the meantime, there has been very little buying.

Cast Iron Pipe

Sterling, Mass., will close bids Aug. 28 for a water system. Fay, Spofford & Thordike, Boston, are the engineers.

Burrillville, R. I., has under consideration plans for a water system. It is a PWA project.

Florham Park, N. J., asks bids until Aug. 30 for 2500 ft. 6-in. bell and spigot; also for two centrifugal pumps and accessories for booster station, air compressor and tank for water supply system. Jaros, Baum & Bolles, 1350 Broadway, New York, are consulting engineers.

Board of District Commissioners, District Building, Washington, asks bids until Aug. 30 for about 8070 ft. 20-in., for main trunk pipe line for water supply in Nichols Avenue, S.E.

Randleman, N. C., asks bids until Aug. 28 for 3100 ft. 8-in., 11,250 ft. 6-in. cast iron pipe; 5100 ft. 2-in., 16,000 ft. 1½-in., 6700 ft. 1-in. galvanized pipe; about 10,000 lbs. cast iron fittings; 75,000-gal. elevated steel tank and tower for water supply system; also for three centrifugal pumps, filtration plant and other waterworks equipment. Harwood Beebe Co., Spartanburg, S. C., is consulting engineer.

Huron, S. D., has awarded 10,000 ft. of 14 and 16-in. pipe to United States Pipe & Foundry Co.

Green Bay, Wis., has placed 1600 ft. of 12-in. pipe with James B. Clow & Sons.

Township of Milwaukee, Milwaukee County, Wis., is about to ask bids for construction of 1200 ft. of 16-in. and 2300 ft. of 8-in. water mains. H. C. Webster, 739 North Second Street, Milwaukee, is consulting engineer.

Hatch, N. M., plans pipe line system for water supply. Fund of \$28,000 has been secured through Federal aid for this and other waterworks. Harvey O. Garst, Engineering Building, Las Cruces, N. M., is consulting engineer.

Seymour, Wis., asks bids until Sept. 6 for quantity, including fittings and specials for pipe line system for water supply. Also for elevated steel tank and tower, pumping machinery and other waterworks equipment. A. E. McMahon Engineering Co., Menasha, Wis., is consulting engineer.

Michigan City, Ind., opens bids Aug. 30 for about 1400 ft. 12-in. and quantity smaller pipe for water supply. Also for other waterworks equipment. Greeley & Hansen, 6 North Michigan Avenue, Chicago, are consulting engineers.

Tuckerman, Ark., plans pipe line system for water supply. Fund of \$50,000 has been arranged for this and other waterworks. F. A. Pritchett, Wallace Building, Little Rock, Ark., is consulting engineer.

Marcelline, Mo., plans about 3 miles 10-in. for trunk line water supply. Cost about \$70,000 with waterworks station at Mussel Fork Creek. Black & Veatch, Mutual Building, Kansas City, Mo., are consulting engineers.

Trimble, Tenn., plans pipe line system for water supply. Fund of \$30,000 has been arranged for this and other waterworks. T. H. Allen, 65 McCall Street, Memphis, Tenn., is consulting engineer.

Board of Water and Power Commissioners, Los Angeles, plans extensions and improvements in water supply system to cost \$116,962, including new trunk pipe lines, \$30,000; new distribution mains, \$30,000; service lines and replacements.

Fallon, Nev., has awarded 445 tons of 4 to 10-in., 100 tons to United States Pipe &

Foundry Co. and 345 tons to Pacific Cast Iron Co.

Eureka, Cal., has taken bids on 128 tons of 8-in., Class B.

Moab, Utah, will take bids Aug. 31 on 120 tons of 4-in.

Phoenix, Ariz., will take bids Aug. 27 on 940 tons of 2 to 24-in.

Fairview, Mont., took bids Aug. 23 on 181 tons of 4 to 8-in.

Ekalaka, Mont., will take bids Aug. 25 on 165 tons of 4 to 8-in.

Culberison, Mont., took bids Aug. 24 on 393 tons of 4 to 8-in.

Active Foreign Demand For Scrap at Boston

BOSTON, Aug. 21.—Interest in scrap centers in the export market, which, at the moment, is fairly active. A boat is loading 7500 tons of No. 1 heavy melting and No. 2 steel for Japan, and another vessel will transport a round tonnage to Scotland originally intended for Poland. Both steamers will leave this week. Exporters are buying against a 5000-ton order of No. 2 cast and stove plate for Poland, and will shortly start loading. The scrap market otherwise is quiet. The Washburn Wire Co. is obtaining an occasional car of No. 1 steel, for which it is paying \$7.25 a ton, delivered, and a few small tonnages of steel turnings for Pittsburgh delivery are moving directly from producers at \$2.05 a ton, f.o.b. Nearby stocks of No. 1 and No. 2 steel and cast are quite limited.

Pig iron sales for the week approximated 750 tons, the heaviest noted in some time. There is no other business in sight, and sentiment among furnace representatives is rather mixed. Some are more hopeful, while others feel a textile strike will put a decided damper on general business.

Steel fabricators are largely active on small tonnages, but several good-sized jobs are in the making and should develop within a month. Reinforcing steel bar business is mostly in small tonnages and there is very little big work in prospect. Cast iron pipe business is improving, thanks to PWA projects, but is by no means active.

Railroad Equipment

Hooker Electrochemical Co. has ordered four tank cars from the American Car & Foundry Co. and four from the General American Tank Car Corp. The cars will be used to carry liquid chlorine.

Chicago Surface Lines has awarded one streamlined street car to the Pullman Car & Mfg. Corp.

Illinois Central will soon announce successful bids on 11 Diesel locomotives.

United States Engineers will take bids Aug. 28 at Kansas City, Mo., for four land booster cars, bodies of riveted steel and 20-ft. wide by 49-ft. long.

United States Engineers have taken bids at Portland, Ore., for 660 tons of rails for Bonneville Dam, on which Colorado Fuel & Iron Products Co. is reported low bidder.

RAILS

Cleveland Rate Rises On Automobile Releases



Ingot Output Up Three Points to 13 Per Cent—Reaffirmation of Prices for Next Quarter Expected

CLEVELAND, Aug. 21.—Demand for finished steel still shows some gain over July, although the volume of business was lighter the past week than during the early part of the month. The recent release of a sizable tonnage of automobile sheets enabled a Cleveland plant to put on an additional open-hearth furnace this week, increasing the ingot output in the Cleveland-Lorain territory to 13 per cent of capacity, a gain of three points. The National Tube plant at Lorain will have been shut down two weeks at the expiration of this week, and it has not been decided whether operations will be resumed next week.

A small amount of fill-in tonnage in sheets and strip steel continues to come from the automotive industry, but demand from other sources is almost negligible. With curtailed operations, consuming plants are not using up these or other steel products as rapidly as was expected when stocks were accumulated in June.

An improvement in September is hoped for by the steel industry. While not much optimism is in evidence regarding the demand from the motor car industry during the fourth quarter, business from this source must necessarily show considerable gain over the current quarter even if very low automobile production schedules are maintained. Stamping plants have been asked to submit quotations on parts for new automobile bodies. Activity outside of the automotive field continues very slack. The only life in the building field is in public work and no business is coming from the railroads.

Pig Iron

Sales and shipments are very light, failing to maintain the volume established in the early part of the month. The slowing down of the automotive industry is reflected in a reduced demand from foundries making automobile castings. Most foundries still have ample stocks. Furnaces will open their books Sept. 1 for the fourth quarter but look for very little contracting, as consumers probably will place current orders to cover requirements. No price change is expected for the coming quarter.

Bars, Plates and Shapes

An award of 386 tons of structural steel has been made for an addition to the Columbus city hall, and a new list of Ohio State highway projects for which bids are being asked includes 470 tons for a Coshocton County bridge. Activity is confined to public work. Demand for steel bars is very light, being sharply affected by an absence of orders from the automotive industry. Plates continue dull.

Sheets

Some small-lot fill-in tonnage continues to come from the automotive industry, but no round-lot buying is expected from that source until motor car manufacturers purchase steel for their new models. Stamping plants are asking for prices on sheets for parts for new models on which their estimating departments are figuring. Consumers in other fields still have good stocks, which, with reduced operations, are not being depleted very rapidly.

Strip Steel

Some new business in lamp stock and in hot and cold-rolled strip for other parts was booked during the week from automotive accessory plants which are increasing schedules slightly for accessories for certain automobile models. These plants are still well supplied with strip in standard sizes. New purchases in sizable lots are expected in September. Demand from other sources is very light.

Iron Ore

Consumption of Lake Superior ore during July was 1,599,865 tons, a decrease of 1,121,584 tons from June. This compares with 2,626,293 tons consumed in July last year. Furnace stocks Aug. 1 amounted to 25,461,213 tons, and stocks at furnaces and Lake Erie docks were 29,961,071 tons as against 27,771,735 tons on the same date last year. Central district furnaces consumed 765,732 tons in July, a decrease of 729,432 tons. Lake front furnaces used 827,296 tons, a decrease of 388,754 tons. Eastern furnaces melted 1054 tons, a decrease of 3530 tons, and all-rail furnaces used 5783

tons, a gain of 132 tons. There were 67 furnaces in blast using Lake ore July 31, a decrease of 13 for the month.

Bolts and Nuts

Demand this month is showing little change from July. Business from the automotive industry is slowing down. Jobbers evidently still have good stocks and are not placing new orders.

Scrap

There is a limited amount of activity in blast furnace scrap but none in steel-making grades. Dealers are paying around \$6.75 for blast furnace scrap for shipment against old contracts. Following recent declines on heavy melting steel and blast furnace grades, short shoveling turnings and No. 1 busheling have declined 50c. a ton and machine shop turnings are 25c. a ton lower.

Further Drop in Steel Output at Buffalo

BUFFALO, Aug. 21.—Buffalo steel makers are continuing to curtail production, and reports are current that at least one plant may institute a holiday shortly until the middle of next month. This report remains unverified. The Lackawanna plant of the Bethlehem Steel Corp., is operating three open-hearts and the Republic Steel Corp., three, while the Wickwire-Spencer Corp., has one active furnace. The Seneca sheet division of Bethlehem is on a 20 per cent basis.

The scrap market is slow. One plant bought 150 tons of No. 1 heavy melting steel at \$9.50. No No. 2 steel was included in the purchase. The No. 1 was all railroad scrap. A somewhat paradoxical situation exists in that there is no market among consuming mills for scrap, yet it is difficult for dealers to buy at prices which might be profitable in the event of a sudden demand.

Virtually no demand for pig iron exists, users having stocked up for their light demands prior to July 1. Most foundries report that business has dried up for the time being.

On the other hand, steel warehouses report very satisfactory business throughout July and thus far in August.

Great Lakes Steel to Rebuild Blast Furnace

CONTRACTS for rebuilding one of the blast furnaces of the Great Lakes Steel Corp., Detroit, has been placed with Arthur G. McKee & Co., Cleveland. The furnace will be relined and somewhat enlarged and a new electric hoist and some other equipment will be installed.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Duluth	1.95c.
Del'd Detroit	1.95c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
Del'd Philadelphia	2.09c.
Del'd New York	2.13c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Roll Steel

(For merchant trade)

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Bullet Steel Reinforcing

(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Reinforcing

(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.80c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.10c.
F.o.b. Chicago	2.15c.
F.o.b. Gary	2.15c.
F.o.b. Cleveland	2.15c.
F.o.b. Buffalo	2.20c.
Del'd Detroit	2.30c.
Del'd eastern Michigan	2.35c.

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts

	Base per Net Ton
F.o.b. Pittsburgh	\$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	52.00
F.o.b. Houston	58.00
F.o.b. cars dock Pacific ports	63.00

Plates

Base per Lb.

F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.95c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.95c.
Del'd New York	2.08c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

Base per Lb.

F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Cleveland	1.95c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.052c.
Del'd New York	2.052c.
F.o.b. Birmingham (standard)	1.95c.
F.o.b. cars dock Gulf ports	2.25c.
F.o.b. cars dock Pacific ports	2.35c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	.15c.
F.o.b. Chicago	.20c.
F.o.b. Boston	.225c.
F.o.b. cars dock Gulf ports	.260c.
F.o.b. cars dock Pacific ports	.260c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

	Base per Lb.
No. 10, f.o.b. Pittsburgh	.85c.
No. 10, f.o.b. Gary	.95c.
No. 10, del'd Detroit	1.05c.
No. 10, f.o.b. Birmingham	1.00c.
ports	1.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	.240c.
No. 24, f.o.b. Gary	.250c.
No. 24, del'd Detroit	.260c.
No. 24, f.o.b. Birmingham	.250c.
ports	.305c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	.250c.
No. 10 gage, f.o.b. Gary	.260c.
No. 10 gage, del'd Detroit	.270c.
No. 10 gage, f.o.b. Phila.	.270c.
No. 10 gage, f.o.b. Birmingham	.255c.
ports	.310c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	.295c.
No. 20 gage, f.o.b. Gary	.305c.
No. 20 gage, del'd Detroit	.315c.
No. 20 gage, f.o.b. Phila.	.324c.
No. 20 gage, f.o.b. Birmingham	.310c.
ports	.350c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	.310c.
No. 24, f.o.b. Gary	.320c.
No. 24, del'd Phila.	.339c.
No. 24, f.o.b. Birmingham	.325c.
ports	.370c.

Long Ternes

No. 24, unassorted 8-lb. coating	.340c.
F.o.b. cars dock Pacific ports	.410c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	.310c.
Tin Mill Black Plate	.310c.

No. 28, f.o.b. Pittsburgh	.275c.
No. 28, Gary	.285c.
No. 28, cars dock, Pacific Coast	.335c.
ports	.35c.

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)	Base per Lb.
8-lb. coating I.C.	\$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.

	Base per Lb.
All widths up to 24 in., P'gh.	.185c.
All widths up to 24 in., Chicago	.195c.
All widths up to 24 in., del'd Detroit	.205c.
All widths up to 24 in., Birmingham	.200c.
Cooperage stock, Pittsburgh	.210c.
Cooperage stock, Chicago	.220c.

Cold-Rolled Strips

Base per Lb.

F.o.b. Pittsburgh	.260c.
F.o.b. Cleveland	.260c.
F.o.b. Worcester	.280c.
F.o.b. Birmingham	.280c.

Fender Stock

No. 16 and heavier, Pittsburgh or Cleveland	.315c.
F.o.b. Worcester	.355c.
No. 17 and lighter, Pittsburgh or Cleveland	.330c.
F.o.b. Worcester	.370c.

Hot-Rolled Rail Steel Strips

discount points less
B. & L., Lorain,
the bill
reducing the

Herr Tubes
o.b. Pitts
Hot
Bolts
87.50
9.50
10.50
11.50
13.00
14.50
17.50
18.50
19.50
22.50
24.00
30.50
35.50
46.50
71.50

Utilities:
ft. 8 \$
ft. 12 1/2 \$
ft. 25 \$
... 40 \$

Tubes
o.b. Pitts
... \$ 9.75
... 11.50
... 12.50
... 13.75
... 15.50
... 16.50
... 18.50
... 21.50
... 23.50
... 28.50
... 35.50
... 44.50
... 68.50

Base
plus 5 %
plus 12 1/2 %
plus 25 %
plus 40 %

TUBES
Pittsburgh
44
13 and 18
16 and 18
17 and 18
18 and 18
20 and 18
21 and 18
2 to 3%
up 4 points
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lb.
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Net Tons
\$47.00
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45.00
48.00
39.00
42.00

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\$35.00
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\$35.00
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34.00
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\$2.50
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2.50
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We've got our machining problem licked with this tool steel!"

MANY a machine-shop foreman has found in Bethlehem Special High-Speed Tool Steel the answer to his production problem.

This tool steel is made in the plant in which, more than 30 years ago, high-speed steels were developed. With the analysis which unceasing research has proved to be the best for the purpose, Bethlehem Special combines the inherent high quality of steel made to laboratory standards of purity by melting in high-frequency electric-induction furnaces and processing at each succeeding step in accordance with the finest steelmaking practice.

The result is a cutting steel that holds its edge at high temperatures. A steel that, with little time out for grinding, cuts hard, tough

materials with combinations of feed, speed and depth of cut normally considered impossible.

Besides giving exceptional results in heavy-duty tools for lathes, planers, boring mills and similar machine tools, Bethlehem Special is an excellent material for twist drills, milling cutters, taps, reamers, gear-cutting hobs, inserted saw teeth, pipe-threading dies, special dies, woodworking tools and punches. At forging heat it can readily be formed into intricate tools, and it is easily annealed.

Bethlehem Special is a member of the distinguished family of Bethlehem Tool Steels, which are briefly described on the following page. There is a grade of Bethlehem Tool Steel for every purpose.



Whatever the Job, you'll find a grade of BETHLEHEM TOOL STEEL

that is just right for it

BETHLEHEM SPECIAL HIGH-SPEED TOOL STEEL

Bethlehem Special High-Speed Tool Steel is used for lathe, planer, boring, slotting, shaping and other roughing tools. It is also used for twist drills, milling cutters, taps, reamers, gear cutters, inserted saw teeth, inserted milling cutter teeth, special dies, wood-working tools, punches, and threading dies. At its forging heat this steel can be readily formed into shapes necessary for making intricate tools. Its properties are such that it can be easily annealed.

BETHLEHEM EXTRA-SPECIAL HIGH-SPEED TOOL STEEL

Bethlehem Extra-Special High-Speed Tool Steel is an outstanding steel for use where super-service is demanded. It is particularly well adapted for machining heat-treated alloy steels, brass, bronze or steel castings, extrusion dies and dummy blocks and for all other unusually heavy-duty work.

BETHLEHEM FINISHING TOOL STEEL

Bethlehem Finishing Tool Steel is an alloy water-hardening tool steel which is recommended for the following: Chilled-roll and brass-turning tools; master tools and taps; milling cutters; reamers; cutters for finish-reaming, boring and rifling guns; automatic screw-machine forming tools; threading tools, chasers and dies; burnishing dies; cold-drawing dies and mandrels for cold-drawing high-speed and carbon tool steels; brass, bronze, copper and steel tubing and bars.

BETHLEHEM XXX SPECIAL TOOL STEEL

Bethlehem XXX Special Tool Steel is the very best grade of carbon finishing tool steel. It may be used for all purposes for which Bethlehem Finishing Tool Steel is recommended and will give equally good results if the cutting speeds are reduced to meet conditions.

BETHLEHEM SUPERIOR TOOL STEEL

Bethlehem Superior Tool Steel is a carbon-vanadium tool steel, combining all the characteristics of a straight-carbon tool steel with better physical properties, greater resistance to fatigue, and superior cutting qualities.

BETHLEHEM XX TOOL STEEL

Bethlehem XX Tool Steel is a general-purpose tool steel of extra-fine quality. This steel is carried in stock in all tempers, suitable for the following: taps and reamers, milling cutters, punches, stamping and blanking dies, broaches, blacksmiths' tools, boilermakers' tools, granite and mining drills and tools, wood-working tools, shear blades, chisels, rivet sets, drop-forging dies, cold-heading bolt and rivet dies, threading dies, headers, trimming dies, and cold-drawing dies.

BETHLEHEM XCL TOOL STEEL

Bethlehem XCL Tool Steel is recommended for all purposes requiring a uniform and reliable yet comparatively inexpensive grade of steel. This steel is used for the following: collets, cups, cones, drop-forging dies, trimming dies, mining and quarrying tools, blacksmiths' tools, fullers, flatters, cold cutters, track tools,

boilermakers' tools, hand and pneumatic chisels, caulking and beading tools, rivet sets, punches and dies, shear blades, and machine parts that require hardening.

BETHLEHEM X TOOL STEEL

Bethlehem X Tool Steel is the lowest-priced grade of carbon tool steel manufactured by Bethlehem Steel Company. It is recommended for purposes where an inexpensive grade of tool steel is satisfactory for the service intended.

BETHLEHEM TOOL ROOM OIL-HARDENING TOOL STEEL

Bethlehem Tool Room Oil-Hardening Tool Steel has been developed especially for use in the tool room in making master tools, dies, intricate pieces, and work of a similar nature.

THESE 5 PROCESSES RESULT IN SUPERFINE TOOL STEEL

QUALITY TOOL STEELS never "happen." The superfine quality of Bethlehem Tool Steels is built up, step by step, with infinite care and patience, throughout manufacture. Each process followed is representative of the most advanced steel-making practice. The result is inevitable: Tool Steels so uniformly fine as to bring marked economies wherever they are used.

HIGH-FREQUENCY INDUCTION MELTING Bethlehem Tool Steels get the right start by melting in the high-frequency electric induction furnace, which makes steel to laboratory standards of accuracy.

LIBERAL INGOT DISCARD

Large discards, from both the top and bottom of the ingot, mean that the buyer gets only the "cream" of the tool steel.

HAMMER-COGGING OF INGOTS

It's far costlier to hammer-cog ingots than to roll them. But the tremendous impact developed under the 14,000-lb. hammer insures a complete working of the entire ingot and the breaking up of all undesirable ingot structure.

PROGRAM-CONTROLLED ANNEALING

The exact heating, soaking and cooling curve desired is obtained by a motor-driven cylinder on which the edge of a plate guides the temperature regulator. Possibilities of human error are eliminated.

RIGOROUS INSPECTION Thoroughly representative cross-sections for inspection are obtained by cutting slabs from the tool-steel billet stock before rolling, and cutting discs from the finished bars. These samples are subjected to hot-acid etch, hardenability tests, and microscopic examination.

It is particularly adapted to this class of service because of non-warping and non-shrinking qualities, combined with hardness and toughness. It hardens and anneals uniformly.

This steel is recommended for use in making punching, blanking, trimming, sub-press, forming and drawing dies; taps; reamers; broaches; circular cutters; hobs; master tools of all kinds; plug, ring thread, and service gauges of a variety of forms.

BETHLEHEM No. 71 ALLOY STEEL

Bethlehem No. 71 Alloy Tool Steel is recommended for hand and pneumatic chisels; for punches and shear blades used for cutting scrap, plates, sheets; for set screws and other heavily stressed machinery parts which must be hardened.

BETHLEHEM TOUGH TOOL STEEL

Bethlehem Tough Tool Steel is a chrome-vanadium steel possessing a high degree of hardness and toughness. It is water-hardening, and is recommended for use in making cold cutters, flogging chisels, ricer and button sets, hand and pneumatic chipping chisels, shear blades, punches and similar tools.

BETHLEHEM LEHIGH DIE AND TOOL STEEL

Bethlehem Lehigh Die and Tool Steel is a high-carbon, high-chromium steel. This steel possesses unusual hardening qualities when hardened in oil or air and is especially well adapted to maximum production service. It also possesses non-warping and non-shrinking properties which make it particularly desirable for punch and die work where freedom from distortion is necessary. It has exceptional machinability for this type of steel.

BETHLEHEM OMEGA TOOL STEEL

This tool steel possesses an exceptional combination of strength and toughness which makes it an outstanding impact-resisting steel. Bethlehem Omega Tool Steel is used in pneumatic chisels, rivet sets, blacksmiths' tools, rivet busters, beading tools, punches, pipe cutter wheels, and in practically all other tools which are subjected to drastic repeated impacts at reasonably low temperatures.

BETHLEHEM No. 57 HOT-WORK TOOL STEEL

Bethlehem No. 57 Hot-Work Tool Steel is a chrome-tungsten steel, especially developed for hot-work tools. This steel possesses exceptional toughness and hardness when working hot metal, which enable it to resist remarkably well the battering action of the header in the hot-heading of bolts and rivets. It is recommended for the following purposes: hot bolt, rivet and spike heading gripper or open dies and headers, hot nut crowners, piercers and punches, hydraulic riveter dies, bull-dozer dies, compression dies, shear blades, and hot chipping chisels.

BETHLEHEM No. 445 HOT-WORK TOOL STEEL

Bethlehem No. 445 Hot-Work Tool Steel is a chrome steel, developed for the same purposes as Bethlehem No. 57 Hot-Work Tool Steel. It has been found equally satisfactory, except where the duty is abnormally severe or when the tool is subjected to unusually high temperatures.

BETHLEHEM STEEL COMPANY



General Offices: BETHLEHEM, PA.

District Offices: Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Indianapolis, Milwaukee, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul, Washington, Wilkes-Barre, York. **Pacific Coast Distributor:** Pacific Coast Steel Corporation, San Francisco, Los Angeles, Seattle, Portland, Honolulu. **Export Distributor:** Bethlehem Steel Export Corporation, New York.

TOOL STEEL WORTHY OF THE FINEST CRAFTSMANSHIP

(Continued from page 58)

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago

Per Cent Off List

Mechine bolts	70
Carrige bolts	70
Lag bolts	70
Flow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank & tapped, hexagons	70
C.N.C. and t. square or hex. nuts, blank or tapped	70
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Steel bolts in packages, Pittsburgh	75
Steel bolts in packages, Chicago	75
Steel bolts in packages, Cleveland	75
Steel bolts in bulk, P'gh.	83
Steel bolts in bulk, Chicago	83
Steel bolts in bulk, Cleveland	83
Tire bolts	60

Large Rivets

($\frac{1}{2}$ -in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland	\$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birmingham	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding \$5.00 per 100 lb. on lots of 200 lb. or more)

Per Cent Off List

Milled cap screws, 1 in. dia. and smaller	75, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	.75 and 10
Milled headless set screws, cut thread $\frac{1}{8}$ in. and smaller	.75
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	.85
Set set screws, cut and oval point	.85
Allied studs	.65

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Uncropped. \$40 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Base price, \$49 a gross ton. Price del'd Detroit is \$52.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton. Open-hearth grade, base. .245c. Delivered price at Detroit is .260c. S.A.E. Alloy Series Differential Numbers per 100 lb.

2000 (1% Nickel)	.50
2100 (2% Nickel)	.55
2300 (3% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20

6100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	.50
6100 (0.40 Molybdenum)	.70
6000 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	.35
5100 Chromium Steel	.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	.45
5100 Chromium Spring Steel	1.20
6100 Chromium Vanadium Bar	
6100 Chromium Vanadium Spring Steel	.95
Chromium Nickel Vanadium	1.50
Carbon Vanadium	.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 5c. higher. The differential for cold-drawn bars is $\frac{1}{2}$ c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and $\frac{1}{2}$ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 2.95c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr, 7 to 9% Ni, 0.08 to 0.20% C)

(Base Prices, f.o.b. Pittsburgh)

Per Lb.	
Bars	.25c.
Plates	.26c.
Sheets	.33c.
Hot-rolled strip	.28c.
Cold-rolled strip	.27c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Uncropped. \$29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham. Uncropped. \$31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Per Gross Ton

Rerolling

Delivered Detroit

Forging

Delivered Detroit

Forging

Delivered Detroit

Billets Only

F.o.b. Duluth

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md. Per Gross Ton

Open-hearth or Bessemer

\$28.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved 1.70c.

Universal 1.70c.

Sheared 1.70c.

Tube Rounds

Base per Lb.

F.o.b. Pittsburgh 1.80c.

F.o.b. Chicago 1.85c.

F.o.b. Cleveland 1.85c.

F.o.b. Buffalo 1.90c.

F.o.b. Birmingham 1.95c.

Wire Rods

(Common soft, base)

Per Gross Ton

F.o.b. Pittsburgh \$33.00

F.o.b. Cleveland 38.00

F.o.b. Chicago 39.00

F.o.b. Anderson, Ind. 39.00

F.o.b. Youngstown 39.00

F.o.b. Worcester, Mass. 40.00

F.o.b. Birmingham 41.00

F.o.b. San Francisco 47.00

CANADA

Pig Iron

Per gross ton:

Delivered Toronto

No. 1 fdy., sll. 2.25 to 2.75..... \$21.00

No. 2 fdy., sll. 1.75 to 2.25..... 20.50

Malleable 21.00

Delivered Montreal

No. 1 fdy., sll. 2.25 to 2.75..... \$22.50

No. 2 fdy., sll. 1.75 to 2.25..... 22.00

Malleable 22.50

Basic 22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) \$85.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21% \$26.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads) \$77.50

50% (ton lots) 35.00

75% (carloads) 126.00

75% (ton lots) 136.00

14% to 16% (f.o.b.) Welland, Ont. (in carloads) (duty paid) .. 31.00

14% to 16% (less carloads) 38.50

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton

6% \$22.75

7% 23.75

8% 24.75

9% 25.75

10% 26.75

11% 27.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton

10% \$27.75

11% 28.75

12% 30.25

13% 31.75

Manganese 1½ to 3%, \$1 a ton additional. For each unit of manganese over 3% \$1 a ton additional. Phosphorus 0.75% or over, \$1 ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carloads \$1.33 to \$1.45

Ferrotungsten, less carloads 1.45 to 1.55

Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads

10.00c.

Ferrocromium, 2% carbon

16.50c. to 17.00c.

Ferrocromium, 0.10% carbon

19.50c. to 20.00c.

Ferrocromium, 0.06% carbon

20.00c. to 20.50c.

Ferrovaniadum, del. per lb. contained V \$2.70 to \$2.90

Ferrocobaltitanium, 15 to 18%

Ti, 6 to 8% C, f.o.b. furnace

carload and contract per net ton. \$13.75

Ferrophosphorus, electric, or blast

furnace material, in carloads, 15% Rockdale, Tenn., base, per gross ton with \$2 unitage..... 50.00

Ferrophosphorus, electric, 24%

f.o.b. Anniston, Ala., per gross ton with \$2.75 unitage..... 65.00

Fermolybdenum, per lb. Mo. del. 95c.

Calcium molybdate, per lb. Mo. del. 80c.

Silico spiegel, per ton, f.o.b. furnace, car lots \$38.00

Ton lots or less, per ton 45.50

Silico-manganese, gross ton, delivered:

2.50% carbon grade 90.00

2% carbon grade 95.00

1% carbon grade 105.00

Spot prices \$5 a ton higher

GRAY FORCE PIG IRON

Valley furnace \$18.25

CHARCOAL PIG IRON

Lake Superior furnace \$21.00

Delivered Chicago 24.04

Delivered Buffalo 24.28

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel.	\$11.00 to \$11.50
No. 2 heavy melting steel.	10.00 to 10.50
No. 2 railroad wrought.	10.00 to 11.50
Scrap rails.	11.00 to 11.50
Rails 3 ft. and under.	14.00 to 14.50
Compressed sheet steel.	10.75 to 11.25
Hand bundled sheet steel.	10.00 to 10.50
Hvy. steel axle turnings.	10.50 to 11.00
Machine shop turnings.	7.50 to 8.00
Short shov. turnings.	7.50 to 8.00
Short mixed borings and turnings.	7.00 to 7.50
Cast iron borings.	7.00 to 7.50
Cast iron earwheels.	11.50 to 12.00
Heavy breakable cast.	10.00 to 10.50
No. 1 cast.	11.50 to 12.00
Rail knuckles and couplers.	13.50 to 14.00
Rail, coil and leaf springs.	13.50 to 14.00
Rolled steel wheels.	13.50 to 14.00
Low phos. billet crops.	14.00 to 14.50
Low phos. sheet bar crops.	13.00 to 13.50
Low phos. plate scrap.	13.00 to 13.50
Low phos. punchings.	13.50 to 14.00
Steel car axles.	14.00 to 14.50

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton	
Heavy melting steel.	\$9.00 to \$9.50
Automobile hvy. melt. steel	8.50 to 9.00
Shoveling steel.	9.00 to 9.50
Hydraulic comp. sheets.	8.00 to 8.50
Drop forge flashings.	7.00 to 7.50
No. 1 busheling.	7.00 to 7.50
Rolled earwheels.	10.00 to 10.50
Railroad tires.	10.00 to 10.50
Railroad leaf springs.	10.00 to 10.50
Axle turnings.	8.00 to 8.50
Steel couplers and knuckles.	10.00 to 10.50
Coil springs.	10.50 to 11.00
Axle turnings (elec. fur.).	8.50 to 9.00
Low phos. punchings.	10.00 to 10.50
Low phos. plates, 12 in. and under.	10.50 to 11.00
Cast iron borings.	5.00 to 5.50
Short shoveling turnings.	5.00 to 5.50
Machine shop turnings.	4.75 to 5.25
Rerolling rails.	10.00 to 10.50
Steel rails, less than 3 ft.	10.00 to 10.50
Steel rails, less than 2 ft.	10.50 to 11.00
Angle bars, steel.	10.00 to 10.50
Cast iron earwheels.	9.50 to 10.00
Railroad malleable.	9.50 to 10.00
Agricultural malleable.	7.75 to 8.25

Per Net Ton

Per Net Ton	
Iron car axles.	\$12.00 to 12.50
Steel car axles.	10.00 to 10.50
No. 1 railroad wrought.	7.50 to 8.00
No. 2 railroad wrought.	8.00 to 8.50
No. 2 busheling.	3.50 to 4.00
Locomotive tires, smooth.	9.00 to 9.50
Pipe and flues.	4.50 to 5.00
No. 1 machinery cast.	8.00 to 8.50
Clean automobile cast.	8.00 to 8.50
No. 1 railroad cast.	7.50 to 8.00
No. 1 agricultural cast.	7.00 to 7.50
Stove plate.	5.25 to 5.75
Grate bars.	4.75 to 5.25
Brake shoes.	6.00 to 6.50

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel.	\$10.00
No. 2 heavy melting steel.	8.50
No. 1 railroad wrought.	\$11.00 to 11.50
Bundled sheets.	9.50
Hydraulic compressed, new.	10.00
Hydraulic, compressed, old.	6.50 to 7.00
Machine shop turnings.	5.50 to 6.00
Heavy axle turnings.	9.00 to 9.50
Cast borings.	5.00 to 5.50
Heavy breakable cast.	10.00 to 10.50
Stove plate (steel works).	8.00 to 8.50
No. 1 low phosph. heavy.	14.00 to 14.50
Couplers and knuckles.	13.50 to 14.00
Rolled steel wheels.	13.50 to 14.00
No. 1 blast furnace.	3.00 to 5.00
Spec. iron and steel pipe.	8.00
Shafting.	15.00 to 16.00
Steel axles.	14.50
No. 1 forge fire.	9.50
Cast iron car wheels.	11.00 to 11.50
No. 1 cast.	11.50 to 12.00
Cast borings (chem.).	12.00 to 14.00
Steel rails for rolling.	12.00

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel.	\$7.00 to \$7.50
Scrap rails for melting.	8.00 to 8.50
Loose sheet clippings.	3.50 to 4.00
Bundled sheets.	5.50 to 6.00
Cast iron borings.	4.75 to 5.25
Machine shop turnings.	4.50 to 5.00
No. 1 busheling.	6.00 to 6.50
No. 2 busheling.	2.50 to 3.00
Rails for rolling.	8.50 to 9.00
Short rails.	11.00 to 11.50
Cast iron earwheels.	7.50 to 8.00
No. 1 machinery cast.	8.75 to 9.25
No. 1 railroad cast.	8.25 to 8.75
Burnt cast.	5.75 to 6.25
Stove plate.	5.75 to 6.25
Agricultural malleable.	7.75 to 8.25
Railroad malleable.	7.75 to 8.25

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel.	\$8.50 to \$9.00
No. 2 heavy melting steel.	8.00 to 8.50
Compressed sheet steel.	8.00 to 8.50
Light bundled sheet stampings.	6.50 to 7.00
Drop forge flashings.	7.50 to 8.00
Machine shop turnings.	6.25 to 6.75
Short shoveling turnings.	7.00 to 7.50
No. 1 busheling.	7.50 to 8.00
Steel axle turnings.	7.50 to 8.00
Low phos. billet crops.	13.25 to 13.75
Cast iron borings.	6.50 to 7.00
Mixed borings and short turnings.	6.50 to 7.00
Rails for rolling.	9.75 to 10.25
Machine shop turnings.	4.50 to 5.00
Heavy turnings.	5.50 to 6.00
Steel axle turnings.	10.50 to 11.00
Iron car axles.	12.50 to 13.00
No. 1 railroad wrought.	5.50 to 6.00
Steel rails less than 3 ft.	10.75 to 11.25
Steel angle bars.	9.00 to 9.50
Cast iron earwheels.	8.00 to 8.50
Boiler plate.	4.50 to 4.80
Heavy axle turnings.	2.50 to 2.80
Axle axles.	3.00 to 3.20
Cast borings.	2.00 to 2.20
Steel borings.	2.50 to 2.80
Wrought pipe.	2.50 to 2.80
Steel axles.	4.50 to 4.80
Axes wrought iron.	4.50 to 4.80
No. 1 machinery cast.	7.75 to 8.00
Stove plate.	4.50 to 5.00
Standard earwheels.	7.25 to 7.50
Malleable.	6.75 to 7.00

ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel.	\$8.75 to \$9.25
No. 1 heavy melting.	8.50 to 9.00
No. 2 heavy melting.	6.50 to 7.00
No. 1 locomotive tires.	9.50 to 10.00
Misc. stand.-sec. rails.	8.75 to 9.25
Hallroad springs.	9.00 to 9.50
Bundled sheets.	6.75 to 7.25
No. 2 railroad wrought.	8.00 to 8.50
No. 1 busheling.	5.00 to 5.50
Cast iron borings and shoveling turnings.	4.75 to 5.25
Rails for rolling.	9.75 to 10.25
Machine shop turnings.	4.50 to 5.00
Heavy turnings.	5.50 to 6.00
Steel axle turnings.	10.50 to 11.00
Iron car axles.	12.50 to 13.00
No. 1 railroad wrought.	5.50 to 6.00
Steel rails less than 3 ft.	10.75 to 11.25
Steel angle bars.	9.00 to 9.50
Cast iron earwheels.	8.00 to 8.50
Boiler plate.	4.50 to 4.80
Heavy axle turnings.	2.50 to 2.80
Axle axles.	3.00 to 3.20
Cast borings.	2.00 to 2.20
Steel borings.	2.50 to 2.80
Wrought pipe.	2.50 to 2.80
Steel axles.	4.50 to 4.80
Axes wrought iron.	4.50 to 4.80
No. 1 machinery cast.	7.75 to 8.00
Stove plate.	4.50 to 5.00
Standard earwheels.	7.25 to 7.50
Malleable.	6.75 to 7.00

DETROIT

Dealers' buying prices per gross ton:	
Heavy melting steel.	\$6.75 to \$7.25
Borings and short turnings.	4.75 to 5.25

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel.	\$0.50 to \$10.50
No. 2 heavy melting scrap.	8.50 to 9.00
Scrap rails.	9.50 to 10.00
New hydraulic comp. sheets.	8.50 to 9.00
Old hydraulic comp. sheets.	7.50 to 8.00
Drop forge flashings.	8.50 to 9.00
No. 1 busheling.	8.50 to 9.00
Hvy. steel axle turnings.	6.50 to 7.00
Machine shop turnings.	4.00 to 4.50
Knuckles and couplers.	11.00 to 11.50
Cast and leaf springs.	11.00 to 11.50
Low phos. billet crops.	11.50 to 12.00
Short shov. steel turnings.	5.50 to 6.00
Short mixed borings and turnings.	5.50 to 6.00
Cast iron borings.	5.50 to 6.00
No. 2 busheling.	5.00 to 5.50
Steel car axles.	10.50 to 11.00
Iron axes.	10.50 to 11.00
No. 1 machinery cast.	10.00 to 10.50
Iron axes.	10.50 to 11.00
No. 1 cupola cast.	9.00 to 9.50
Stove plate.	8.50 to 8.75
Steel rails, 3 ft. and under.	12.00 to 12.50
Cast iron earwheels.	10.00 to 10.50
Industrial malleable.	10.00 to 10.50
Railroad malleable.	10.00 to 10.50
Chemical borings.	7.00 to 7.50

BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel.	\$7.00 to \$8.00
No. 2 heavy melting steel.	5.50 to 6.50
Heavy breakable cast.	6.50 to 7.00
No. 1 machinery cast.	7.00 to 7.50
No. 2 cast.	6.25 to 6.75
Stove plate.	5.00 to 5.50
Steel car axles.	10.75 to 11.50
No. 1 railroad wrought.	7.50 to 8.00
No. 1 yard wrought, long.	6.50 to 7.00
Spec. iron and steel pipe.	4.50 to 5.00
Forge fire.	5.50 to 6.00
Rails for rerolling.	7.50 to 8.00
Short shoveling turnings.	2.50 to 3.00
Machine shop turnings.	2.50 to 3.00
Cast borings.	3.50 to 3.75
No. 1 blast furnace.	2.00 to 2.50
Steel car axles.	11.00 to 11.50
Cast borings (chemical).	8.00 to 8.50
Unprepared yard iron and steel.	3.00 to 4.00

Per gross ton, delivered local foundries:	
No. 1 machinery cast.	\$10.75
No. 1 hvy. cast (cupola size).	9.75
No. 2 cast.	8.25

*For direct car loading only.
†Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel.	\$10.00
Scrap steel rails.	9.00
Short shoveling turnings.	5.50
Stove plates.	7.00 to 7.50
Steel axes.	10.50 to 11.00
Iron axes.	10.50 to 11.00
No. 1 railroad wrought.	7.00
Rails for rolling.	10.50 to 11.00
No. 1 cast.	9.00 to 9.50
Tramcar wheels.	9.00 to 9.50
Cast iron borings, chem.	8.00

CANADA

Dealers' buying prices per gross ton:

Toronto Montreal

Toronto Montreal	

<

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.	Per Cent Off List
Plates	3.15c.	Tank rivets, 7/16 in. and smaller.... 55
Structural shapes	3.15c.	Machin and carriage bolts, lag screws, fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts
Soft steel bars and small shapes	2.90c.	1000 lb. or over 60
Reinforcing steel bars	2.90c.	200 to 999 lb. 55 and 5
Cold-finished and screw stock—		100 to 199 lb. 50 and 5
Rounds and hexagons	3.45c.	Less than 100 lb. 50
Squares and flats	3.45c.	*No. 26 and lighter take special prices.
Hoops and bands under 1/4 in.	3.20c.	
Hot-rolled annealed sheets (No. 24)	3.20c.	
25 or more bundles	3.30c.	
Galv. sheets (No. 24), 25 or more bundles	3.30c.	
Hot-rolled sheets (No. 10)	2.95c.	
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	3.69	
Splines, large	2.90c.	
Track bolts, all sizes, per 100 count		
65 per cent off list.		
Machine bolts, 100 count		
65 per cent off list.		
Carriage bolts, 100 counts		
65 per cent off list.		
Nuts, all styles, 100 count		
65 per cent off list.		
Large rivets, base per 100 lb.	4.50c.	
Wire, black, soft ann'l'd, base per 100 lb.	2.70c.	
Wire, galv. soft, base per 100 lb.	2.925c.	
Common wire nails, per kg.	2.824c.	
Cement coated nails, per kg.	2.834c.	
On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.		
*Delivered in Pittsburgh switching district.		

CHICAGO

	Base per Lb.	Per Cent Off List
Plates and structural shapes	3.20c.	
Soft steel bars	2.95c.	
Cold-fin. steel bars and shafting		
Rounds and hexagons	3.50c.	
Flats and squares	3.50c.	
Hot-rolled strip	3.50c.	
Hot-rolled annealed sheets (No. 24)	3.85c.	
Galv. sheets (No. 24)	4.55c.	
Hot-rolled sheets (No. 10)	3.05c.	
Nails (9/16 in. and lighter)	3.50c.	
bolts	4.65c.	
structural (kg lots)	3.50c.	
boiler (kg lots)	3.50c.	
Machine bolts	60 and 5	
Carriage bolts	60 and 5	
Coch and lag screws	60 and 5	
Hot-pressed nuts, sq. tap. or blank	60 and 5	
Hot-pressed nuts, hex. tap or blank	60 and 5	
Hex. head and cap screws	60 and 5	
Cup point set screws	70 and 10	
Flat head bright wood screws	37 1/2 and 10	
Spring cotter	50	
Stove bolts in full packages	70 and 10	
Rd. hd. tank rivets, 7/16 in. and Rd. smaller	57 1/2	
Wrought washers	\$4.50 off list	
No. 8 black ann'l'd wire per 100 lb.	3.85c.	
Com. wire nails, base per kg	3.85c.	
Cement c't'd nails, base per kg.	3.05c.	

NEW YORK

	Base per Lb.	Per Cent Off List
Plates, 1/4 in. and heavier	3.40c.	
Structural shapes	3.75c.	
Soft steel bars, small shapes	3.22c.	
Iron bars	3.22c.	
Iron bars, swed. charcoal	6.50 to 7.25c.	
Cold-fin. shafting and screw stock		
Rounds and hexagons	3.92c.	
Flats and squares	4.42c.	
Cold-roll. strip, soft and quarter hard	3.82c.	
Hoops	3.52c.	
Bands	3.82c.	
Hot-rolled sheets (No. 10)	3.27c.	
Hot-rolled ann'l'd sheets (No. 24)	3.85c.	
Galvanized sheets (No. 24*)	4.50c.	
Long term sheets (No. 24)	5.20c.	
Standard tool steel	11.00c.	
Wire, black annealed (No. 10)	3.25c.	
Wire, galv. (No. 10)	3.85c.	
Tire steel, 1 x 4 in. and larger	3.62c.	
Open hearth spring steel	4.00c. to 10.00c.	
Common wire nails, base per kg.	33.21	
Per Cent		
Machine bolts, cut thread:	Off List	
Up to 1 in. dia. inclusive	60	
Over 1 in. dia.	50	
Carriage bolts, cut thread:		
Up to 1/4 in. dia. inclusive	60	
Over 1/4 in. dia.	50	
Boller tubes:	Per 100 Ft.	
Lap welded, 2-in.	\$18.05	
Seamless welded, 2-in.	19.24	
Charcoal iron, 2-in.	24.94	
Charcoal iron, 4-in.	63.65	
*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.		

ST. LOUIS

	Base per Lb.	Per Cent
Plates and struc. shapes	3.44c.	
Bars, soft steel or iron	3.19c.	
Cold-fin. rounds, shafting, screw stock	3.74c.	
Hot-rolled annealed sheets (No. 24)	4.09c.	
Galv. sheets (No. 24)	4.79c.	
Hot-rolled sheets (No. 10)	3.29c.	
Black corrug. sheets (No. 24)	4.09c.	
*Galv. corrug. sheets	4.79c.	
Structural rivets	3.99c.	
Boiler rivets	4.09c.	

PACIFIC COAST

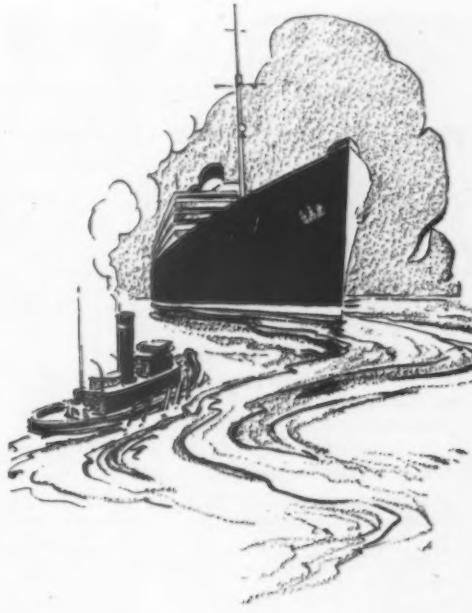
	Base per Lb.	Hot - rolled sheets
Plates, tank and U. M.	3.55c.	(No. 10) 3.75c. 3.80c. 3.75c.
Shapes, standard	3.55c.	Gal. sheets (No. 24) 5.00c. 5.05c. 5.00c.
Soft steel bars	3.60c.	Cold finished steel 5.95c. 5.95c. 4.75c.
Reinforcing bars	3.50c.	Squares and hexagons 7.20c. 7.20c. 6.00c.
		Flats 7.70c. 7.70c. 7.00c.
		Common wire nails —base per kg less carload \$3.10 \$3.25 \$3.35
		All items subject to differentials for quantity.

New Prices on Fence Posts And Diaphragm Steel

NEW minimum prices filed to become effective in the last month of the third quarter include a quotation of \$56 a net ton, Birmingham, on painted angle end and corner posts (concrete set or dirt set) and a price of 12c. a lb., base Pittsburgh or Cleveland, on cold-rolled chrome vanadium diaphragm steel (analysis approximately SAE 6150 at Pittsburgh and SAE 6135 at Cleveland).

Jobber Agreements Signed

Companies that have signed jobber agreements for the sale of concrete reinforcing bars (straight lengths), in accordance with Regulations No. 6 under Section 4 of Schedule E of the steel code, include the Gate City Iron Works, Omaha, Neb.; Builders Structural Steel Co., Cleveland, and Paper, Calmenson & Co., Inc., St. Paul, Minn.



Spelter Bookings Mount to 3800 Tons; Negligible Demand Depresses Tin Price

Copper Market Continues to Be Quiet and Utterly Featureless;
Lead Temporarily Inactive as Most Consumers Are Covered

NEW YORK, Aug. 21.—Activity in the Blue Eagle copper market continues to be almost negligible, with day-to-day sales aggregating only about 200 tons. The only encouraging features are the steadily improving statistical position of copper and the fact that shipments to consumers are being maintained at a fairly high level. However, there is sufficient copper already purchased to satisfy all consumer needs until mid-October, and the buying market is expected to be rather featureless until that time. The foreign market was slightly off this morning, with exchange transactions being made at about 7.05 to 7.10c. a lb., c.i.f. usual Continental base ports. Very little consumer business was placed during the week, and the immediate outlook

for Europe as an outlet for the American production surplus is not very encouraging.

Tin

Domestic consumers have ignored this metal during the past week, and the market is currently almost stagnant at 52.10c. a lb. for Straits at New York. The lack of demand from this country has served to force down world prices, and London quotations on first call this morning closed the weekly period approximately £3 lower at £227 10s. for both spot and future standard and £229 17s. 6d. for Straits at Singapore. It was reported this morning that a buyer for the buffer pool account was supporting the market abroad at the new low level. However, the support was largely nominal

in view of the small tonnages which changed hands. As production quotas have been returned to the 40 per cent level, the tin market should improve statistically within the next three months.

Zinc

As in other periods in the past, the apparently quiet condition of the Prime Western market last week was deceptive. Total sales for the week rose sharply to 3780 tons, mostly at 4.30c. for delivery over the next two months, as compared with 1832 tons in the previous week and 2200 tons two weeks earlier. It is difficult to account for the heavier sales unless they merely represented a chance accumulation of business. It is not likely that the price of spelter will go much beyond 4.30c. in the near future despite the improving statistical position. Consuming demand has currently been considerably under expectations, and the prospects for a sizable pickup in the fall are not very bright. In addition the developments in the Tri-State ore district will probably not exert much influence during the next month. Prices for concentrates are unchanged at \$27 and \$28 a ton for flotation and prime grades. Ore production last week was approximately 8000 tons, sales amounted to 5810 tons, and stocks now stand at about 15,650 tons. Unless additional curtailment results in reducing the stocks even more, the mines will probably have considerable difficulty in raising the concentrate price to \$30 a ton.

Lead

One seller experienced a pickup in business during the past two days and succeeded in disposing of its daily ore intake. However, the trade as a whole is only slightly active, which is only natural inasmuch as most consumers have their needs well covered. Current bookings for August delivery are in the neighborhood of 40,000 tons, although actual consumption for the month will probably not exceed 32,000 tons. As a consequence September sales may fall below expectations, although around 16,000 tons has already been placed. It is likely that consumer interest will lag until late August, at which time October books will be opened. The rush for August tonnage was actuated by the price decline to 3.75c. a lb., New York. The market is still steady at that level, and it is doubtful whether a rise will occur until the discouraging statistical trend is altered or consumption improves more rapidly than is expected.

Ingot Brass

The average prices paid during the 28-day period ended Aug. 10 by consumers of commercial 85-5-5 and commercial 80-10-10 ingots were 8.76c. and 10.37c. a lb. respectively. One month previously these prices were 8.75c. and 10.268c. a lb. respectively.

The Week's Prices. Cents Per Pound for Early Delivery

	Aug. 15	Aug. 16	Aug. 17	Aug. 18	Aug. 20	Aug. 21
Electrolytic copper, N. Y.*†....	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, Eastern delivery*....	9.12½	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, Spot, N. Y.....	52.40	52.20	52.37½	52.25	52.10	52.10
Zinc, East St. Louis.....	4.30	4.30	4.30	4.30	4.30	4.30
Zinc, New York.....	4.65	4.65	4.65	4.65	4.65	4.65
Lead, St. Louis.....	3.60	3.60	3.60	3.60	3.60	3.60
Lead, New York.....	3.75	3.75	3.75	3.75	3.75	3.75

*Blue Eagle copper. †Refinery price ¾c. higher in Connecticut Valley.

Quotations below cover wholesale lots, f.o.b. New York.

Aluminum, 98-99 per cent, 22.90c. a lb.

Aluminum, remelt, No. 12 (grade 3), 12.75c. a lb., average for week.

Nickel electrolytic cathode, 35c. a lb.; shot and ingot, remelt electro, 36c. a lb.

Antimony, 8.62½c. a lb. Quicksilver, per flask of 76 lb., \$75.

Brass ingots, 95-5-5-5, 8.75c. a lb.

From New York Warehouse	
Delivered Prices, Base per Lb.	
Tin, Straits pig.....	54.25c. to 55.25c.
Tin, bar.....	56.25c. to 57.25c.
Copper, Lake.....	10.25c. to 11.00c.
Copper, electrolytic.....	10.00c. to 10.50c.
Copper, castings.....	9.75c. to 10.75c.
*Copper sheets, hot-rolled.....	16.00c.
*High brass sheets.....	14.50c.
*Seamless brass tubes.....	17.00c.
*Seamless copper tubes.....	17.25c.
Brass rods.....	13.00c.
Zinc, slabs.....	5.75c. to 6.75c.
Zinc sheets (No. 9), casks, 1200 lb. and over.....	10.25c.
Lead, American pig.....	4.50c. to 5.50c.
Lead, bar.....	5.50c. to 6.50c.
Lead, sheets.....	7.50c.
Antimony, Asiatic.....	10.00c.
Alum., virgin, 99 per cent, plus.....	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent.....	18.00c. to 19.00c.
Solder, ½ and ¼.....	32.50c. to 33.50c.
Babbitt metal, commercial grades.....	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse	
Delivered Prices per Lb.	
Tin, Straits pig.....	55.75c.
Tin, bar.....	57.75c.

Copper, Lake.....	10.00c.
Copper, electrolytic.....	10.00c.
Copper, castings.....	9.75c.
Zinc, slab.....	5.75c. to 6.00c.
Lead, American pig.....	4.75c. to 5.00c.
Lead, bar.....	7.75c.
Antimony, Asiatic.....	9.00c.
Babbitt metal, medium grade.....	18.50c.
Babbitt metal, high grade.....	59.75c.
Solder, ½ and ¼.....	33.75c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.....	6.25c. 7.00c.
Copper, hvy. and wire.....	6.00c. 6.75c.
Copper, light and bottoms.....	5.00c. 5.87½c.
Brass, heavy.....	3.25c. 3.87½c.
Brass, light.....	2.87½c. 3.50c.
Hvy. machine composition.....	4.75c. 5.25c.
No. 1 yel. brass turnings.....	4.37½c. 5.12½c.
No. 1 red brass or compos. turnings.....	4.25c. 5.25c.
Lead, heavy.....	2.87½c. 3.37½c.
Zinc.....	2.25c. 3.00c.
Cast aluminum.....	9.62½c. 10.75c.
Sheet aluminum.....	11.00c. 12.50c.

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Reinforcing Steel

Awards 3750 Tons—New Projects
1700 Tons

Brooklyn, N. Y., 340 tons, sewer, to Igoe Brothers.

Queens Borough, New York, 230 tons, sewer, to Igoe Brothers.

State of Oregon, 650 tons, Umpqua River bridge, divided evenly between Soule Steel Co. and Mercer Steel Co.

Lane County, Ore., 525 tons, State bridge over Siuslaw River, to Soule Steel Co.

Newport, Ore., 1075 tons, Yaquina Bay bridge for State, to Pacific Coast Steel Corp.

Stockton, Cal., 750 tons rail reinforcing, wharf and transit shed, to Simmons Co. of Cal.

State of California, 118 tons, bridges in two counties, to an unnamed bidder.

Huntington Beach, Cal., 276 tons, elementary school, to Soule Steel Co.

Altadena, Cal., 100 tons, Jackson School, to Blue Diamond Corp.

Kern County, Cal., 157 tons, State paving, to Soule Steel Co.

Los Angeles County, Cal., 100 tons, material for Verduga Wash, to J. W. Black Co.

NEW REINFORCING BAR PROJECTS

Grafton, W. Va., 875 tons, Tygart Valley reservoir dam, Pittsburgh Flood Commission; bids about Oct. 15.

Chicago, 110 tons, addition to Olson Rug Co.'s plant.

State of Illinois, 200 tons, road and bridge work, bids to be opened Aug. 28.

Chicago, 100 tons, building at Monroe and Dearborn Streets.

Los Angeles County, Cal., 100 tons, Barham Blvd. bridge over Los Angeles River.

Los Angeles County, Cal., 135 tons, two bridges on Alhambra Wash, bids Sept. 6.

Pearl Harbor, T. H., 200 tons, radio station at Naval Base, Spec. No. 7525, bids Sept. 5.

Pipe Lines

Bureau of Reclamation, Denver, Colo., asks bids until Sept. 4 for 72 and 60-in. welded steel plate penstock and outlet pipes for outlet works, Pine View Dam, Ogden River Project, Utah; quantity 38-in. welded steel pipe and accessory parts; quantity of 20, 16, 12 and 8-in. steel pipe for collecting system, and steel pipe and fittings for water supply system at Ogden City, Pine View Reservoir, same project noted (Specification 585). (Materials will be installed by Government under another contract.)

Barnesville Development Co., Barnesville, Ohio, plans steel pipe line at St. Clairsville, Ohio, and vicinity for natural gas distribution. Cost about \$50,000.

United States Industrial Alcohol Co., Curtis Bay, Baltimore, and 60 East Forty-second Street, New York, plans new 12-in. steel pipe line from Fairfield to Curtis Bay, about 2½ miles, for steam service at plant. Thomas E. Murray, Inc., 88 Lexington Avenue, New York, is consulting engineer.

United States Engineers, Jacksonville, Fla., asks bids until Aug. 28 for 88 pieces, 12-ft. lengths, rivet-weld steel shore discharge pipe (Circular 181).

Olathe, Colo., closed bids Aug. 9 for 9000 ft. 8-in. and 3000 ft. 6-in. steel pipe for main trunk line water supply.

Purchasing Bureau, Board of Education, 1445 South San Pedro Street, Los Angeles, asks bids until Aug. 27 for 18,000 ft. 1½-in. galvanized steel pipe, standard weight, plain ends (Bid No. 649).

Troy, Ala., plans about 68,000 ft. 2, 3 and 4-in. steel pipe lines for gas distribution



The highly developed WYCKOFF Cold Drawn Steel process is a year around guarantee of maximum machinability, greater tensile strength and improved elastic limits—all of which enable many prominent manufacturers to establish a new high speed tempo of production for machine screw parts at low cost. Why not standardize your production with WYCKOFF Cold Drawn Steel? You will find it profitable in many ways.

WYCKOFF DRAWN STEEL COMPANY

General Offices: First National Bank Bldg., Pittsburgh, Pa.

Mills at Ambridge, Pa. and Chicago, Ill.

Manufacturers of
Cold Drawn Steels

Turned and Polished Shafting

Turned and Ground Shafting

system. Financing is being arranged. Bids will be asked soon. Charles A. McKean & Associates, Troy, are engineers.

Lovelock, Nev., 275 tons, 71,400 ft. of 6 and 8-in. steel pipe, to Crane Co. and sublet to National Tube Co.

Los Angeles, 350 tons, black steel pipe for Mono Basin, divided among four bidders.

Los Angeles, 290 tons, welded pipe for Metropolitan Water District, to Southern Pipe & Casing Co.

Alhambra, Cal., 178 tons, 16 and 20-in. steel pipe, to American Pipe & Steel Co.

Standard Oil Co. of California has purchased 750 tons of 12½-in. O. D. pipe from Pittsburgh Steel Co., and about 1600 tons of 16, 18 and 22-in. pipe from National Tube Co.

Fabricated Structural Steel

Awards in Lower Volume—New Projects Higher

BOOKINGS of the week in the structural steel field called for 11,400 tons, compared with 15,600 tons a week ago. Included among awards was 4700 tons for a viaduct in Baltimore. New projects rose to 13,900 tons from 13,200 tons last week and 7600 tons two weeks ago. A bridge at Saugus, Mass., will take 2400 tons, and a Pine River, Utah, project will take 1450 tons. Plate projects total 12,300 tons, including 5000 tons for a refinery at Aruba, in the West Indies. Sheet piling awards of 4375 tons include 4000 tons for the spillway for the Bonneville Dam. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Dover Point, N. H., 170 tons, State highway bridge, to Lackawanna Steel Construction Corp.

South Royalton, Vt., 180 tons, bridge, to Lackawanna Steel Construction Corp.

Stamford, Vt., 175 tons, highway bridge, to American Bridge Co.

Saratoga Springs, N. Y., 115 tons, bottling plant, to Smith & Caffrey Co.

Long Island City, N. Y., 180 tons, warehouse for National Sugar Refining Co., to Ingalls Iron Works.

Routes 30 and 48, N. J., 345 tons, railroad bridges, to American Bridge Co.

State of Maryland, 160 tons, highway bridge, to American Bridge Co.

Washington, D. C., 410 tons, Howard University building, to Lehigh Structural Steel Co.

Schuylkill County, Pa., 135 tons, highway bridge, to Phoenix Bridge Co.

Westville, N. J., 350 tons, State highway bridge, to American Bridge Co.

State of Pennsylvania, 630 tons, highway bridges, to Lackawanna Steel Construction Corp.

Baltimore, 4700 tons, Orleans Street viaduct, to American Bridge Co.

State of New Jersey, 190 tons, highway bridge over Reading Railroad, to American Bridge Co.

West Chester, Pa., 220 tons, garage and shops for Berwick Lumber & Supply Co., to Reading Metalcraft Co., Reading, Pa.

State of Pennsylvania, 120 tons, Schuylkill County bridge, to Phoenix Bridge Works.

Philadelphia, 200 tons, factory addition for Independent Mfg. Co., to McClintic-Marshall Corp.

CENTRAL STATES

Columbus, Ohio, 386 tons, addition to City Hall, to unnamed fabricator.

Deerfield, Ill., 450 tons, high school addition, to an unnamed bidder.

Council Bluffs, Iowa, 250 tons, underpass for Burlington Railroad, to Omaha Steel Works.

Plymouth, Mich., 158 tons, bridge for Pere Marquette Railroad, to American Bridge Co.

Scott and Carver Counties, Minn., 235 tons, highway bridges, to American Bridge Co.

Omaha, Neb., 595 tons, viaduct, to Omaha Steel Works.

Bismarck, N. D., 310 tons, school building, to Crown Iron Works, Minneapolis.

SOUTH AND SOUTHWEST

Louisville & Nashville Railroad, 350 tons, bridges, to Virginia Bridge & Iron Co., Inc.

WESTERN STATES

Missoula, Mont., 160 tons, Montana University building, to Minneapolis-Moline Power & Implement Co.

McCall, Idaho, 120 tons, State highway bridge, to Minneapolis-Moline Power & Implement Co.

Portland, Ore., 4000 tons sheet piling, Bonneville spillway dam, to Columbia Steel Co.

State of Oregon, 150 tons sheet piling, Umpqua River bridge, to Pacific Coast Steel Corp.

Sacramento, Cal., 210 tons sheet piling, M Street bridge, to Pacific Coast Steel Corp.

PENDING

NORTH ATLANTIC STATES

Milton, Mass., 200 tons, junior high school.

Lind-Revere, Mass., 2400 tons, bridge over Saugus River.

Boston, 1000 tons, Boston City Hospital surgical ward.

New York, 4500 tons, pier shed No. 32 in Hudson River; bids in by Sept. 5. Previously reported as 3500 tons.

Reading, Pa., 500 tons, junior high school; new bids being taken Sept. 11.

Pittsburgh, 300 tons, City incinerator.

THE SOUTH

State of West Virginia, 485 tons, highway bridges.

Augusta, Ga., 325 tons, Savannah Bluff lock and dam; United Engineers Office.

Kenton County, Ky., 643 tons, highway bridge; bids opened Aug. 24.

Louisville, Ky., 200 tons, building.

Kingsport, Tenn., 700 tons, bridge.

CENTRAL STATES

State of Ohio, 470 tons, Coshocton County bridge over Tuscarawas River; bids Aug. 31.

State of Ohio, 100 tons, Gallia County bridge; bids Aug. 24.

Chicago, 500 tons, Chicago Tribune Radio Building; R. C. Wieboldt Co., general contractor.

Meridiosia, Ill., 109 tons, highway bridge; bids opened Aug. 22.

Bartelso, Ill., 575 tons, highway bridge; bids opened Aug. 22.

Milwaukee, 300 tons, sewage disposal plant.

The Milwaukee Road, 600 tons, bridge.

Detroit, 600 tons, shapes and plates for rebuilding blast furnace for Great Lakes Steel Corp.

WESTERN STATES

Ogden, Utah, 1450 tons, Pine River project.

Parkin, Utah, 200 tons, State highway underpass.

Boulder Dam, 350 tons, crane runways.

Sacramento, Cal., 100 tons sheet piling, Butte Slough outfall gates, bids Aug. 31.

Los Angeles, 600 tons, California Fruit Growers Exchange office building; bids soon.

Los Angeles, 200 tons, County bridge; bids soon.

Los Angeles, 100 tons, tank for City; bids soon.

FABRICATED PLATE AWARDS

New York, 1170 tons, nine tanks for Richfield Oil Corp., to be erected at various

points in New York and Rhode Island, to Chicago Bridge & Iron Co.

INQUIRIES

New York, 1000 tons, oil storage tanks in Sumatra for Standard Oil Co. of New Jersey.

New York, 5000 tons, storage tanks on the island of Aruba, West Indies, for Royal Dutch Shell.

San Francisco, 2500 to 4800 tons, 12 tanks for Standard Oil Co. to be located at Estero Bay and Rio Bravo, Cal., bids taken on three alternates.

San Francisco, 1500 tons approximately, 500,000 barrel storage tankage at Richmond, Cal., for Standard Oil Co., bids will be taken shortly.

Oxygen Cylinder Valves Have Stainless Ball Seat

AIR REDUCTION SALES CO.

Lincoln Building, New York, has announced that more than 96 per cent of its oxygen cylinders are now equipped with valves having a stainless steel ball seat. In appearance these new valves closely resemble the older type and have the same easy opening and closing and tight sealing qualities. In addition, as they do not corrode or score, leakage is eliminated.



Similar types of stainless steel ball valves have been used on all Aircod-B welding and cutting torches for more than three years, and it is stated that except for occasional renewal of stem packing these torches have rarely required valve repairs.

Boiler Drums for New Cruisers

THE Navy Department has awarded contracts for the boiler and superheater drums and appurtenances for the cruisers Brooklyn and Philadelphia to Combustion Engineering Co., Inc. The contract includes 64 welded drums and contains an option for similar equipment for one, two or three additional vessels. These vessels are being constructed at the Brooklyn and the Philadelphia Navy Yards respectively, and the boilers will be built at the yards.

Illinois Manufacturers Ask for Tariff Hearing

A PLEA for public hearings on proposed tariff adjustments has been sent to Secretary of State Hull by James L. Donnelly, executive Vice-President of the Illinois Mfrs. Assn. The letter follows: "In behalf of the manufacturers of Illinois, whose products embrace nearly every variety fabricated in the active competition of foreign goods produced by low-priced labor, the Illinois Mfrs. Assn. requests that adequate hearings be held in connection with all proposed tariff adjustments under the new tariff act and that interested manufacturers be notified of such hearings.

"This will be in the interest of industries who now employ many thousands of persons in Illinois whose continued employment may be in jeopardy by the admission to this country at more favorable tariff rates of the products of meagerly paid foreign workers.

"It is respectfully urged that in the public notice of such tariff hearings,

(1) That public notice be given of the products in respect to which changes in existing tariff duties or when any other special provisions are being considered.

(2) That such public notices state the nature and extent of the changes under consideration.

(3) That industries engaged in the manufacture or production of articles in connection with which adjustments in tariff are proposed be specifically notified of said hearings as well as of the nature and the extent of the changes under consideration.

(4) That full opportunity be given to the industries whose products are involved to present their views to the committee on reciprocity information before the agreement is concluded.

COMING MEETINGS

September

Association of Iron and Steel Electrical Engineers. Sept. 18 to 20. Annual meeting, Cleveland. J. F. Kelly, Empire Building, Pittsburgh, secretary.

National Industrial Advertisers Association. Sept. 20 to 22. Twelfth national conference and convention, Starrett Netherland Plaza Hotel, Cincinnati. Gregory H. Starbuck, General Electric Co., Schenectady, N. Y., program chairman.

Electrochemical Society. Sept. 27 to 29. Fall meeting, Hotel Pennsylvania, New York. Colin G. Fink, Columbia University, New York, secretary.

Metalweld, Inc., 2617 Hunting Park Avenue, Philadelphia, has been appointed by the Universal Power Corp., Cleveland, as distributor for its Universal arc welders, electrodes and welding supplies.

N. J. Clarke, vice-president in charge of sales, Republic Steel Corp., Youngstown, Ohio, announces the appointment of Buhl Sons Co., Detroit, Mich., as a distributor of Toncan Iron. Complete warehouse stocks of Republic's Toncan Iron will be maintained by the new distributor.

BUNDYWELD

STEEL TUBING

Resists Vibration

Because of its ability to withstand vibration, its great strength, and recuperative properties, Bundyweld Tubing has been proven superior for such installations as gas, oil, brake, and vacuum lines. It has the strength of steel with sufficient ductility to permit easy fabrication.

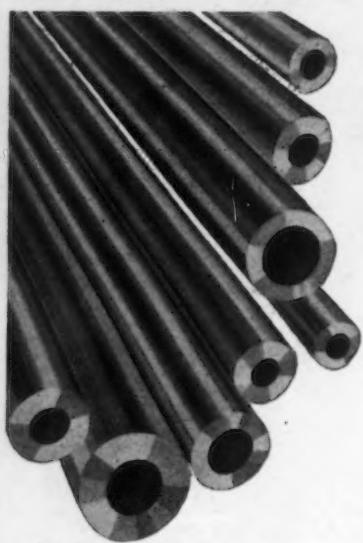
Bundyweld Steel Tubing is rolled from strip steel which has been previously copper-coated on two sides, and is then Copper-Hydrogen-Welded into a solid structure.

The reducing atmosphere of the welding process leaves the tube absolutely clean and free from scale. It may be heat-treated without injury.

Both I. D. and O. D. are held to tolerances of .003". Uniformity of wall thickness is an outstanding feature. Bundyweld tubing is furnished in base sizes of $\frac{1}{16}$ ", $\frac{1}{8}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ ", and $\frac{5}{8}$ " in various wall thicknesses. It can be redrawn to any odd size required. Furnished in lengths of completely fabricated, either with or without fittings. Send blue prints or samples for quotations. Complete information upon request.

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TOOL STEEL TUBING

NON-SHRINK
OIL HARDENING
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for RING DIES
CUTTING DIES
SPACERS, BUSHINGS, Etc.

Manufacturers of BISCO Tungsten Carbide
drawing dies for wire, rod and tubing.

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Cincinnati

Worcester

CLEVELAND, OHIO

Buffalo

Special Equipment Employed in Machining Large Caliber Guns

(Concluded from Page 15)

angular or curved position on the bench; and as a shoe attached to the rack slides along the former bar with the forward movement of the rifling bar, the rack is moved transversely over the bar bed. A gear on the rifling bar is rotated by the transverse movement of the rack, imparting the required rotation to the rifling bar.

Record Grooves Cut In Rifling Bar

When a certain twist has been established as satisfactory and duplicate rifling operations will be required, a record groove is cut in the rifling bar. The machine is provided with a special rest with a milling cutter which is mounted on the front end of the bar bed. As the rifling bar is driven forward, and rotated by means of the former bar, a spiral groove is cut along the surface of the rifling bar. All subsequent rifling operations requiring this twist are cut without setting up the former bar, as a bronze key, held stationary in the front bar support and fitted to the groove cut in the bar, will cause the required rotation of the rifling bar as the bar is driven forward. It is only necessary, therefore, to set up the former bar for grooves with a new twist or for experimental operations. A number of grooves,

each one for a different twist, may be cut in the same bar, as shown in Fig. 6. In this same figure, the nut which holds the bronze key in position may be seen on top of the front bar support.

The machine in Fig. 4 is prepared for milling a groove in the rifling bar. The special rest with milling cutter is in position on the front end of the bar bed, and five supports for the rifling bar as it moves forward are in place on the gun bed.

After rifling, the outside of the gun is finish turned to its final dimensions and the ends faced-off to correct length. The screw box is also threaded for the insertion of the breech mechanism.

Inserting Liners In Guns With Enlarged Bores

Guns which have been in service are bored for the insertion of liners. When a gun has been fired a number of times with full powder charge, the friction of the projectile and the rushing gases together with some probable chemical action produces a scoring of the bore called erosion. This gradually enlarges the bore and reduces the accuracy of the gun. When the enlargement becomes excessive, the gun is returned to the fac-

tory, placed in a lathe and enough metal removed from the bore for the insertion of a liner. The hole is bored with a very small taper, increasing from the muzzle toward the breech.

The liner is rough turned and bored in machines of the type shown in Fig. 1, and is finish turned with the required taper on the finishing lathe. The gun is lowered muzzle down into a heating furnace, and the cold liner is positioned above it as shown in Fig. 7. When the gun has been expanded a sufficient amount, the liner is lowered into position and the gun cooled. After cooling, the gun is finish bored and rifled.

The capacity of some of these machines is for guns larger than those permitted on shipboard by existing international naval agreements. Their power and rigidity, however, makes them very efficient tools for operations on guns with dimensions within the prescribed limits.

Creep Properties of Oil-Still Tubes

(Concluded from Page 21)

no change after creep test at 1100.

Specimens given the E treatment are still running in the creep test, and their impact resistance will be determined at a later date.

The Findings Summarized

Increase in carbon content from 0.139 to 0.181 per cent in a 4 to 6 per cent chromium, 0.50 per cent molybdenum steel increased the physical properties and creep resistance materially.

Longitudinal material showed better creep resistance than transverse material of either carbon content, but the differences were small and less than 10 per cent.

Better creep properties were obtained from slow-cooled materials as compared with normalized materials.

Uniform structures with well defined grain were obtained by slow cooling, but normalized and reheated materials of comparable hardness showed less uniform structures.

Impact resistance of transverse material was lower than for longitudinal material.

Impact tests made on specimens subjected to load and temperature for 1000 hr. or more revealed no notable drop in toughness. With some of the structures resulting from initial heat treatment, slight reduction was noted, but even in these cases large measure of toughness remained.

Power Requirement for Cold Strip Rolling

(Concluded from Page 28)

form to the general pattern, either the accuracy of the data upon which the curve is based may be questioned or else the kind of steel being rolled may be relatively harder or softer than that used for the rest of the curves.

The curves in Fig. 5 were obtained from data published in the form of total horsepower hours per net ton, as compared with thickness in inches, by A. F. Kenyon in *Iron and Steel Engineer* for March, 1934. These data were translated into total pounds pull per inch of width as compared with total thickness in mils, for the sake of convenience. Curve B, for an entering thickness of 0.065, fits in very well with the family of curves in Fig. 7. Curve A, for an entering thickness of 0.190 in., does not agree very well with the only other curve available for a comparable entering thickness. Whether these curves are for different kinds of steel or whether one or the other is based on incorrect data, only additional information on material of approximately this thickness can indicate. Presumably, both curves are for mild steel. It is hoped that additional data will be forthcoming from the various operating people to clear up this discrepancy.

OBITUARY

(Continued from Page 40)

ornamental iron department of the Ingalls Iron Works for four years.



WILLIAM H. OSBORNE, pioneer Milwaukee industrialist, died Aug. 13, aged 80 years. He was born in Tecumseh, Mich., and settled in Milwaukee in 1870. In 1878 he founded the Wisconsin Malleable Iron Co., which became inactive following a disastrous fire several years ago. Mr. Osborne also was the founder of the Lakeside Malleable Casting Co., Racine, Wis., serving many years as president and more recently as chairman of the board. His son, William V. Osborne, is head of the concern.



HENRY K. BROOKS, president of the Capital Iron Works Co. and of the Steel Fixtures Mfg. Co., Topeka, Kan., died of a cerebral hemorrhage in that city on Aug. 12, aged 65 years. He was born and educated in England, and following several years of engineering experience there, came to this country. For several years he was chief engineer of the United States Lighting & Heating Co. For a time

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(No. 8 of a series published in the interest of machine tool buyers and sellers)

he was connected with several railroads and then was named professor of mechanical engineering at the Kansas State Agricultural College. He went to Topeka in 1890 to take over the management of the Capital Iron Works.



JAMES BIGGS, president of Biggs & Co., Wichita Falls, Tex., wholesale machinery and hardware dealers, died on July 29.



C. A. DONOVAN, assistant superintendent of the City Machine & Tool Works, Dayton, Ohio, was killed in an automobile accident on July 13 while on his way to A Century of Progress. He was 48 years old and had been identified with the company for 18 years.



FRANK DUDLEY HEATH, district sales manager at Detroit for the Jones & Laughlin Steel Corp., died

at his home on Aug. 11. Born at Warner, N. H., 54 years ago, he joined the Boston office of the Jones & Laughlin company shortly after completing his schooling. He went to Detroit as district manager in 1915.



FREDERIC W. HOWE, vice-president of the Crompton & Knowles Loom Works, Worcester, Mass., and manager of the company's Providence, R. I., plant until it was moved to Worcester in 1932, died at a hospital in Providence on Aug. 16, after a month's illness. He was born at Shrewsbury, Mass., Jan. 5, 1875, and had been connected with the Worcester concern since 1901.



ALFRED M. WILLISIE, president, the Badeker Mfg. Co., Chicago, manufacturer of railroad supplies, died Aug. 18, from a heart attack. He was 70 years old.



PLANT EXPANSION AND EQUIPMENT BUYING

Lack of Confidence Hampers Tool Buying

TYPICAL of the entire capital goods industry, machine tool demand is marking time because of the lack of confidence of investors and business men in the Administration's purposes. Under ordinary conditions the outlook would be optimistic because of the obvious needs for replacement of producing machinery. Plant managers, owners and financial interests associated with industrial equipment buying are reluctant to add to capital expenditures or to expend replacement funds until there is further clarification of the President's purposes. As a result, orders are primarily for single machines from scattered sources.

◀ NORTH ATLANTIC ▶

Argus Gas & Oil Sales Co., Inc., 136 Flatbush Avenue Extension, Brooklyn, N. Y., has acquired tract of land at Greenpoint Avenue and Newtown Creek as site for new bulk oil storage and distributing plant, to consist of several units with gross capacity of 1,000,000 gals. Cost over \$500,000 with steel tanks, pumping machinery and other equipment. Edward M. Warff is engineer.

Board of Education, Park Avenue and Fifty-ninth Street, New York, will install manual training departments in two new multi-story high schools on Staten Island, on block bounded by Brighton, Summit, Arlington and Yetman Avenues, Tottenville, and in Oakwood district, respectively, where sites have been selected. Cost \$976,900 and \$1,110,900, in order noted. Appropriations are being secured through Federal aid. W. C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect for board and superintendent of school buildings.

World Beater Mfg. Corp., New York, has been organized, capital \$1,000,000, by Paul C. Wiegandt, 1075 Greene Avenue, Brooklyn, and associates, to manufacture kitchen utensils and equipment.

Webster Sheet Metal Works, 3610 Third Avenue, New York, manufacturer of roofing and other sheet metal products, has leased one-story building on site 25 x 100 ft., at 1417 Brook Avenue, and will occupy for new plant.

Emporia Gold Mines, Inc., New York, care of Kurtz Wilson, 50 East Forty-second Street, vice-president, plans early operation of gold mining properties in Arizona, and is arranging fund of \$175,000 for construction of mill, power station and other units, and purchase of equipment. George H. Bruce, address noted, is president.

John M. McClusky, 2536 Bathgate Avenue, Bronx, New York, has filed plans for new two-story automobile service, repair and garage building, 83 x 100 ft., at 531-35 East Fordham Road. Cost about \$60,000 with equipment. Jardine, Murdock & Wright, 347 Madison Avenue, New York, are architects.

Signal Supply Officer, Army Base, Brooklyn, asks bids until Aug. 27 for 500 mast sections (Circular 8); until Sept. 4 for quantity of tubes (Circular 9); until Sept. 7 for 10 motor-generators and 50 motor-generator and battery units (Circular 7).

Municipal Department of Docks, Pier A, North River, New York, plans installation of following mechanical-handling equipment in new two-story steel shed on existing Pier No. 88, Forty-eighth Street and North River: Elevators, estimated cost, \$57,600; conveyors, \$15,600; gravity chutes, \$13,200; incinerators, electrical system, etc. Entire unit will cost about \$1,425,000. Similar mechanical equipment will be installed in similar new steel sheds on Piers Nos. 90 and 92, at Fifteenth and Fifty-second Streets and North River respectively. Complete project will cost \$4,275,000. Fund has been secured through Federal aid.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 28 for eight main reduction gears and spare parts (Schedule 3094), two electric-driven winches and spare parts (Schedule 3103) for Brooklyn and Philadelphia Navy Yards; for 100 ammeters and 50 voltmeters (Schedule 3141) for Philadelphia Yard.

Hartol Products Corp., 117 Liberty Street, New York, has acquired tract of land of Revere, Boston, in harbor district, as site for new bulk oil storage and distributing terminal. New plant will consist of several large units, equipped for initial capacity of 230,000 bbl. Cost about \$400,000 with steel tanks, pumping equipment and other machinery.

Board of Education, Malverne, N. Y., plans manual training department in new multi-story school. Bids will soon be asked on general contract. Cost \$251,800. Fund has been secured through Federal aid. F. P. Wiedersum, 240 Rockaway Avenue, Valley Stream, N. Y., is architect.

Commanding Officer, Picatinny Arsenal, Dover, N. J., asks bids until Aug. 27 for one coal crusher (Circular 30).

Electric Boat Co., 40 Wall Street, New York, has concluded negotiations for purchase of

boatbuilding plant of Electro Dynamic Co., Avenue A, Bayonne, N. J., consisting of eight one-story shops and mechanical buildings on site 194 x 330 ft., and will occupy for boatbuilding works.

Universal Manufacturers, Inc., Hackensack, N. J., has been organized by Victor E. Havens and George Holladay, 33 Mercer Street, to manufacture machinery and other mechanical equipment.

J. T. Baker Chemical Co., Phillipsburg, N. J., plans new one-story steam power house for factory service. Cost about \$45,000, with equipment. J. G. Berger, 24 Commerce Street, Newark, N. J., consulting engineer.

Board of Education, Fort Lee, N. J., plans manual training department in new group high school. Cost about \$400,000. Special election will be held in September to approve bonds. Hacker & Hacker, 201 Main Street, architects.

Charles Eneu Johnson & Co., Tenth and Lombard Streets, Philadelphia, manufacturer of printing inks, etc., plans rebuilding of two-story plant unit at Swanson and Ritner Streets, destroyed by fire Aug. 14. Loss about \$25,000 with equipment.

Commanding Officer, Frankford Arsenal, Philadelphia, asks bids until Aug. 27 for quantity of taper plug gages, plain plugs, flush pins, etc. (Circular 49).

Blue Valley Slate Co., Slatington, Pa., plans rebuilding of one-story finishing mill at local industrial slate works, recently destroyed by fire. Loss close to \$21,000 with machinery.

◀ BUFFALO DISTRICT ▶

Board of Education, Wilson, N. Y., plans manual training department in new multi-story school. Cost \$220,000 with equipment. Fund has been secured through Federal aid. Chester R. Phelps, Gluck Building, Niagara Falls, N. Y., architect.

Buffalo Muffler Co., Inc., Buffalo, has been organized by G. C. Starkweather, 168 Argonne Drive, Kenmore, N. Y., and L. L. Haas, 173 Commonwealth Avenue, Buffalo, to manufacture automobile equipment, automatic devices, parts, etc.

Buffalo Freight Terminal & Warehouse Co., Liberty Bank Building, Buffalo, plans rebuilding of storage and distribution terminal on Fuhrmann Drive, recently destroyed by fire. Loss about \$135,000 with elevating, conveying, loading and other mechanical equipment.

Metals & Alloys, Ltd., Toronto, Ont., S. R. Francis, manager, recently organized, has leased portion of local plant of Toronto Metal Foundries, Ltd., 10 Wiltshire Avenue, and will equip at once for production of metal and metal alloy products.

◀ NEW ENGLAND ▶

Erving Paper Mills, Erving, Mass., manufacturer of wrapping papers, tissue stocks, etc., has let general contract to E. J. Kennedy, Jr., Holyoke, Mass., for new two-story addition, 80 x 80 ft. Cost about \$40,000 with equipment.

School Board, Milton, Mass., plans manual training department in new junior high school for which bids are being asked on general contract. Cost \$355,000, fund secured through Federal aid. Ralph H. Doane, 60 Batterymarch Street, Boston, architect.

Waterbury Auto Spring Co., Waterbury, Conn., has been organized by Joseph D. Veltette, 32 Whittlesey Avenue, and O. S. Mon-

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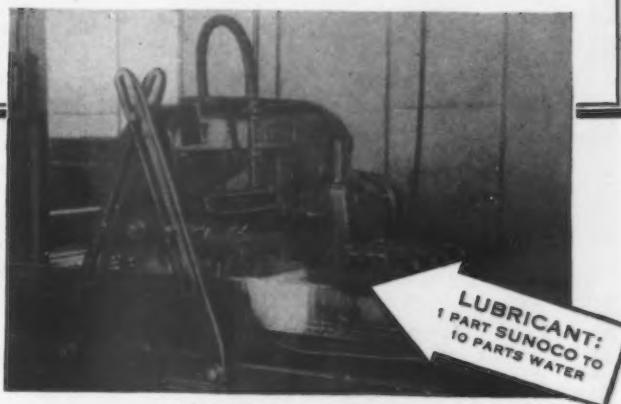
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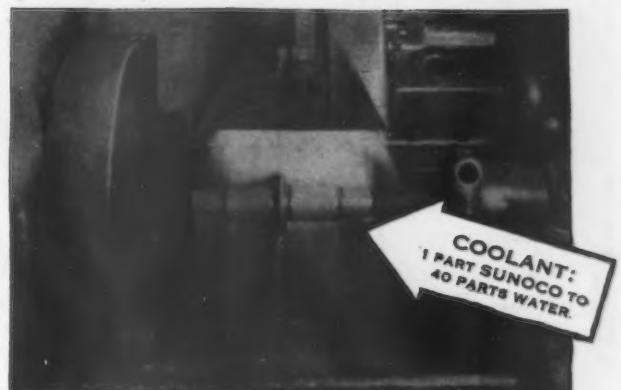
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MACHINE: CINCINNATI HYDROMATIC MILLER.
MATERIAL: COLD DRAWN STEEL.
SPINDLE SPEED: 65 R. P. M.
FEED: 8 INCHES PER MINUTE.



Courtesy of CLEVELAND TRACTOR Co., Cleveland

OPERATION: FINISH GRINDING, LOWER TRACK WHEEL SHAFT, ALL BEARING DIAMETERS AND BOTH SHOULDERS.
MACHINE: CINCINNATI PLUNGE CUT GRINDER, DOUBLE WHEEL.
MATERIAL: S. A. E. NO. 1035; ROCKWELL C37.
STOCK REMOVED: .025 INCH; .010 ON SHOULDERS.
WHEEL: 24 INCH DIAMETER; 2½ INCH WIDE.
WHEEL SPEED: 1030 R. P. M.
SURFACE SPEED: 74 FEET PER MINUTE.

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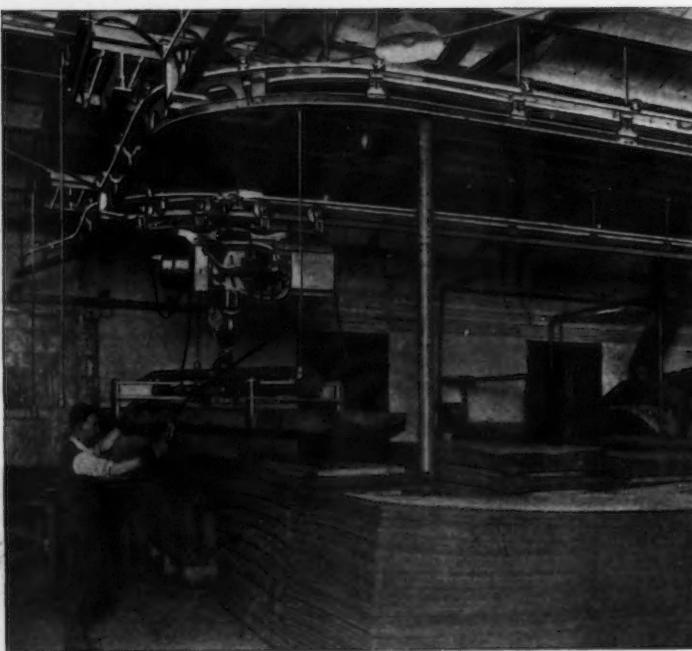
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tambault, 372 Circular Avenue, to manufacture automobile springs and kindred equipment.

Beardsley & Wolcott Mfg. Co., Thomaston Avenue, Waterbury, Conn., manufacturer of special hardware products, electric household appliances, etc., in receivership for number of months, will be sold as a going concern under orders of Superior Court.

Colonial Beacon Oil Co., 30 Beacham Street, Everett, Boston, has plans for new bulk oil storage and distributing plant at Portland, Me., and soon takes bids for initial units. Cost over \$60,000 with steel tanks, pumping machinery, etc.

Artisan Metal Products, Inc., Boston, has been organized by Robert Sinton and James Donagan, 18 Ware Street, Cambridge, Mass., to manufacture metal goods.

A. & P. Corrugated Box Co., 42 Plympton Street, Boston, has leased two floors in building at 33 Troy Street, and will occupy for new plant.

Board of Education, Hamden, Conn., plans machine shop and other manual training units in new high school group, for which bids are being asked on general contract. Cost about \$700,000. R. W. Foote, New Haven, Conn., architect.

◀ SOUTH ATLANTIC ▶

Florida Cane Products Corp., Twenty-eighth Lane and Florida East Coast Railway, Miami, Fla., plans new distilling plant on adjoining site, including construction of new bottling works, storage and distribution building, and improvements in existing structures for new line of production. Cost over \$60,000 with equipment. Robert M. Little, Twenty-fourth and Ocean Streets, is architect; Jorgensen & Schreffer, News Tower Building, are engineers.

United States Engineer Office, Jacksonville, Fla., asks bids until Aug. 28 for one forged carbon steel cutter shaft, and two cast steel cutter shaft jaw couplings (Circular 184).

Fort Valley Bottling Co., Fort Valley, Ga., plans extensions and improvements with installation of new equipment. Cost close to \$25,000. Pringle & Smith, Norris Building, Atlanta, Ga., are architects.

Board of Trustees, Georgia Industrial College, Industrial College, Ga., has begun construction of new one-story industrial arts building, 40 x 150 ft. Cost about \$35,000 with tools and equipment.

Construction Service, Veteran's Administration, Washington, asks bids until Aug. 28 for new boilers and other steam power plant equipment for institution at Augusta, Ga.

Indian River Growers, Inc., Vero Beach, Fla., T. N. Stewart, secretary, has approved plans for new one-story citrus fruit packing plant on North Dixie Highway, 90 x 135 ft. Cost about \$25,000 with mechanical-drying, conveying, loading and other equipment.

◀ OHIO AND INDIANA ▶

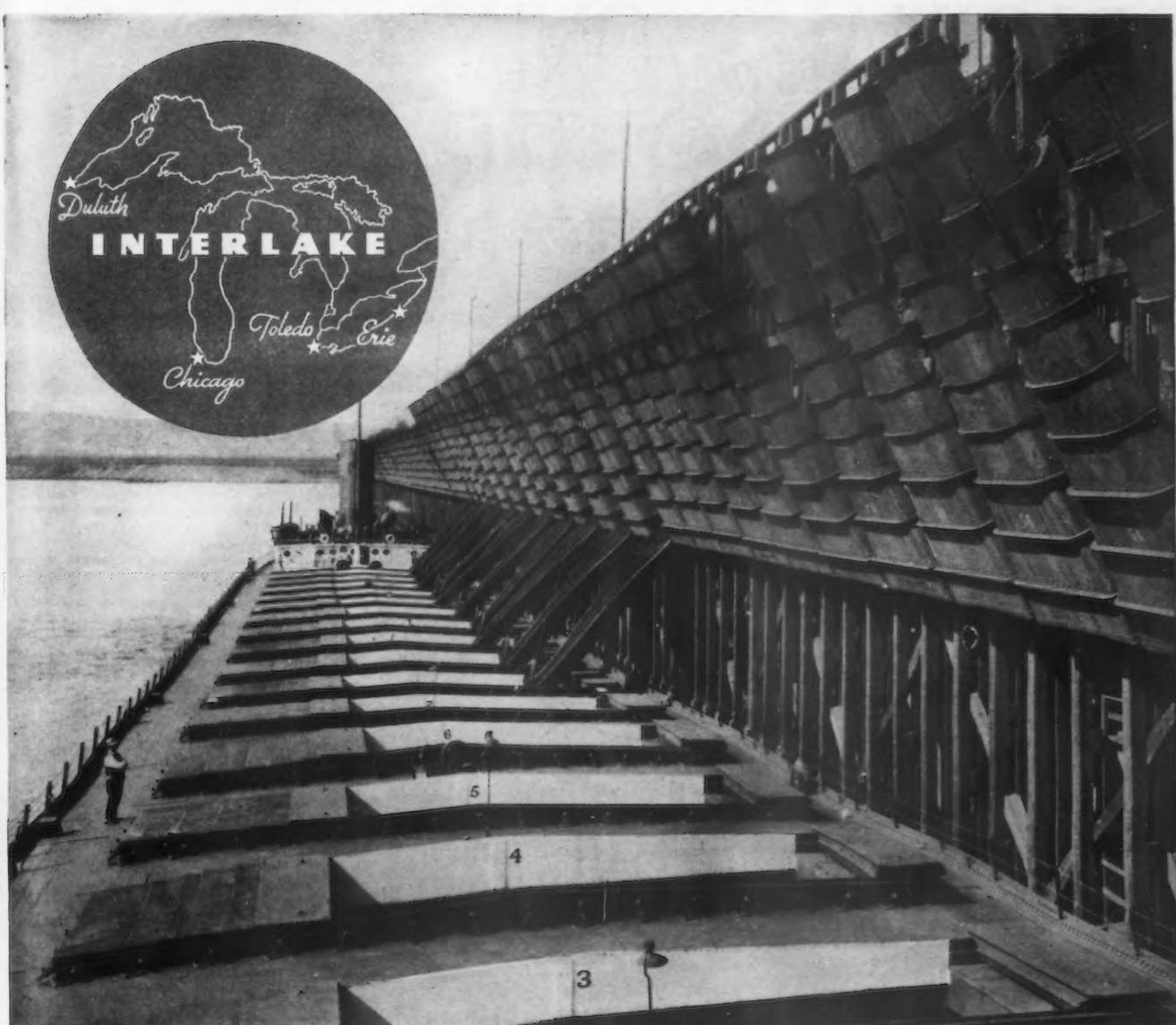
Clifton Distilling Co., Cleveland, recently organized, care of John W. Little, Plymouth Building, architect, has taken over property at 2500 West Twenty-fifth Street, and will remodel and equip for new distillery. Cost about \$50,000 with machinery. Wallace W. Leipner, Plymouth Building, is consulting engineer.

Hopple Handle Co., Tiffin, Ohio, plans immediate rebuilding of portion of plant recently destroyed by fire. Loss about \$25,000 with equipment.

Curtis Key Cutter, Inc., Cleveland, has been organized by William H. Curtis and associates, care of Manuel Koslen, 540 Leader Building, representative, to manufacture key cutters and kindred mechanical equipment.

Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Aug. 27 for 2172 running lamp reflectors (Circular 55), one magnetizing unit and one demagnetizing unit (Circular 52); until Aug. 30 for 1000 brackets, 1000 horns, 600 venturi pilot relief tubes, etc. (Circular 59); until Aug. 31 for 210 flare rack assemblies (Circular 54); until Sept. 4 for quantity of bolts, clevis bolts, plungers, screws, springs, mount assemblies (Circular 65); until Sept. 7 for 500 gage manifold pressure assemblies (Circular 61); until Sept. 10 for 150 voltmeter assemblies and 300 ammeter assemblies (Circular 58).

Middletown Distilling Corp., 1103 Mahoning Bank Building, Youngstown, Ohio, E. E. Welch, president, lately organized, has engaged Charles Owlesy, Home Savings Bank Building, architect, to prepare plans for re-



THE location of Interlake Iron Corporation plants along the Great Lakes system permits effective use of water transportation. The Corporation's water shipments of ore, coal and limestone amount to millions of tons per year.

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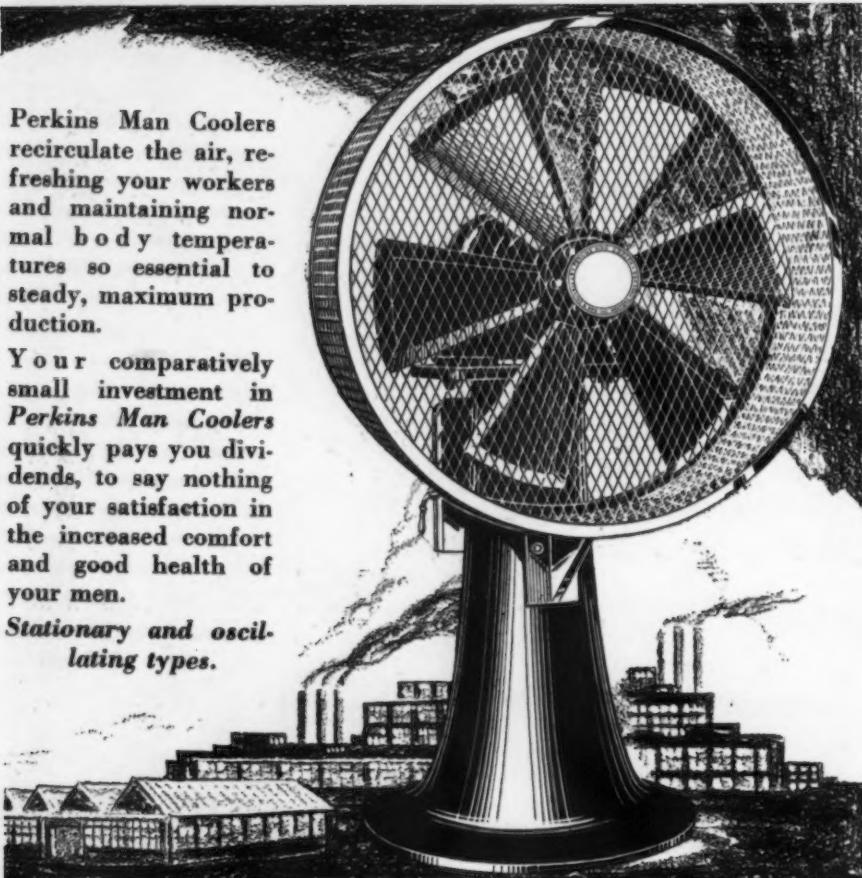
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modeling and improving plant of Western Reserve Brewing Co., Youngstown Road, Warren, Ohio, which has been acquired for new distillery. Bids will soon be asked. New equipment will be installed. Cost over \$100,000 with machinery.

American Coach & Body Co., 3809 Clark Avenue, S. W., Cleveland, manufacturer of automobile bodies, has acquired adjoining property, 100 x 150 ft., and other neighboring land, and will use for early enlargement in plant. James Holan is president.

Department of Waterworks, 321 Franklin Street, Michigan City, Ind., Thomas P. Donnelly, secretary, asks bids until Aug. 30 for complete equipment for municipal water system, including elevated steel tanks and towers, motor-driven pumping machinery, gasoline engine pumping machinery, transformers, controllers, switchboard, switching equipment, valves, sluice gates, pipe lines, etc. Greeley & Hansen, 6 North Michigan Avenue, Chicago, are consulting engineers.

Miller Electroplating, Inc., 301 N. W. First Street, Evansville, Ind., has been organized by

I. H. and Paul E. Miller, address noted, to operate a metal electroplating and finishing works.

WASHINGTON DISTRICT ▶

National Advisory Committee for Aeronautics, Langley Field, Va., asks bids until Sept. 4 for scales, scale heads, levers, linkage units and other wind-tunnel balance equipment (Requisition 267); until Sept. 5 for one 1000/8000 hp. wound-rotor induction motor unit with slip regulator control, condenser, auxiliary motors, switching equipment, meters, etc., for operating driving propeller for high-speed wind-tunnel.

Stuart Hamm, Charlottesville, Va., formerly treasurer of Albemarle County, is at head of project to construct and operate new local distilling plant with initial capacity of about 500 gal. per day. Cost about \$75,000 with equipment. New company will be organized with capital of \$100,000 to carry out program.

Board of District Commissioners, District Building, Washington, asks bids until Sept. 4 for one full crawler-type tractor.

Service Stores Corp., Baltimore, care of G. E. Carlstrand, 10 West Chase Street, consulting engineer, plans new coke storage and distribution plant in Sparrows Point district, with capacity of 300 tons; including elevating, conveying, loading and other equipment with handling capacity of 40 tons per hour.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Aug. 29 for winches and accessories for antenna and power system, and lighting distribution lines, for six radio towers at high power radio station, Annapolis, Md. (Specification 7735).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 28 for fuel oil service pumps, booster pumps, and lubricating oil service pumps and spare parts (Schedule 3107), oil burners, blowers, pressure parts, fittings and spare parts (Schedule 3105), fresh water pumps and spare parts (Schedule 3101); until Aug. 31 for about 350,000 lb. steel chain (Schedule 3136) for eastern Navy Yards.

◀ WESTERN PENNA. ▶

Erie Malleable Iron Co., Twelfth and Cherry Streets, Erie, Pa., in receivership, has secured permission from Court to arrange Federal financing for \$349,783.08 for reorganization and resumption of operations.

Pennsylvania Electric Co., Johnstown, Pa., an interest of Associated Gas & Electric System, 61 Broadway, New York, plans rebuilding of power substation near Indiana, Pa., known as Possum Glory Station, recently destroyed by fire. Loss close to \$100,000 with equipment.

E. I. duPont de Nemours & Co., Wilmington, Del., has approved plans for new plant at Belle, near Charleston, W. Va., for production of solid urea, a patented technical agricultural product used in connection with commercial fertilizers, etc. Cost about \$300,000 with machinery. Proposed to have plant ready for service by close of year.

National Fruit Product Co., Martinsburg, W. Va., has plans for one-story addition to plant at North Martinsburg, to be equipped as an evaporating unit. Cost about \$25,000 with machinery.

◀ MIDDLE WEST ▶

Container Corp. of America, Inc., 111 West Washington Street, Chicago, manufacturer of corrugated and other paperboard containers, boxes, etc., will make extensions and improvements in different plants throughout country, including Chicago factories, during next nine months to cost about \$800,000, with new equipment for increased capacity and replacements. Power plants will be expanded.

Sherwin-Williams Co., East 115th Street and Cottage Grove Avenue, Chicago, manufacturer of paints, varnishes, oils, etc., has let general contract to Austin Co., 510 North Dearborn Street, for new four-story utility and operating building, 60 x 100 ft. Cost about \$100,000 with equipment. Headquarters are at 101 Prospect Avenue, N. W., Cleveland.

Consolidated Parts Corp., 6225 South Cottage Grove Avenue, Chicago, has been organized by Lawrence Cohn and I. D. Ponick, to manufacture automobile and other mechanical parts and equipment.

Dubuque Packing Co., Sixteenth and Sycamore Streets, Dubuque, Iowa, meat packer, is planning new additions, including improvements in present plant. Cost over \$40,000 with equipment.

Summitville Consolidated Mines, Inc., Summitville, Col., has plans for new ore treating mill at local gold-mining properties. New unit will be electric-operated, equipped for initial capacity of 100 tons per day. Cost over \$80,000 with machinery.

Common Council, Fairfax, Minn., has been authorized at special election to arrange plans for new municipal electric light and power plant, using Diesel engine-generator units and electrical distribution system. Bids will be asked soon.

Old Town Beverage Corp., 44 Main Street, Dubuque, Iowa, has taken over local building and will remodel and equip for new liquor rectifying plant. Cost about \$25,000 with equipment. H. F. Smith is secretary and treasurer.

District Commander, Nineteenth Forestry District, Camp Chicago-Lemont, Willow

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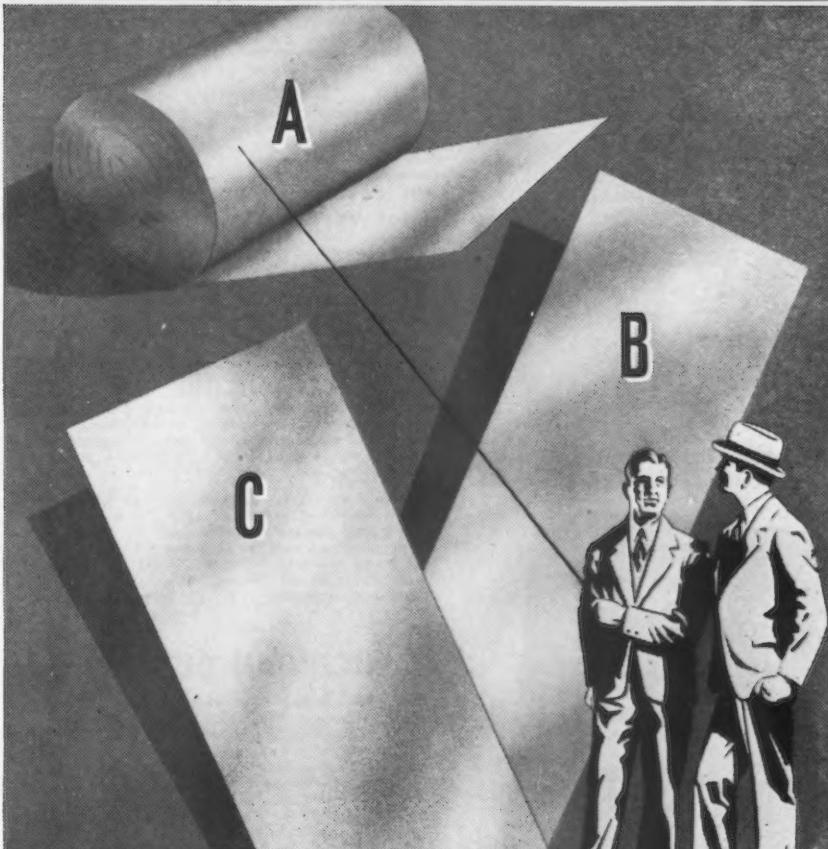
B stands for better performance; and by better performance we mean stainless steel easier to form, punch, draw, spin and weld. Easier, because ARMCO STAINLESS STEELS are processed scrupulously from ingot to finely-finished sheets, strip, or plates. No pains are spared; no contribution to low-cost fabrication for you is overlooked. You get what you pay for.



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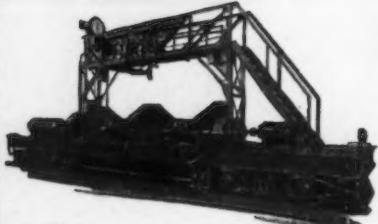
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Springs, Ill., asks bids until Aug. 27 for power house, pumping plant, one-story service and garage building, one-story equipment storage and distributing building, and other structures for Camp Marseilles, Marseilles, Ill. (Circular 14); at same time, for similar units at Camp Hinsdale Parkway, near Hinsdale, Ill. (Circular 30).

Chicago, Milwaukee, St. Paul & Pacific Railway Co., Union Depot, Milwaukee, has under consideration bids for construction of new sandblast building, 30 x 150 ft., at West Milwaukee locomotive and car shops. F. M. Sloane is district engineer.

Air Conditioning Equipment Corp., Milwaukee, has changed corporate title to Syncromatic Air Conditioning Corp., and increased capital stock from \$20,000 to \$40,000 to accommodate expansion. Plant recently has been moved from 257 East Keefe Avenue to larger quarters at 1317 North Third Street, with additional facilities for manufacturing domestic, commercial and industrial heating, cooling and ventilating systems. Richard C. Jeptinger is vice-president and general manager.

Board of Vocational Education, Beloit, Wis., has plans by Otto A. Merman, architect, Gateway City Bank Building, LaCrosse, Wis., for two-story addition to vocational school estimated to cost \$40,000 with equipment. J. A. McCreary is director.

City Council, Seymour, Wis., closes bids Aug. 30 on construction of waterworks plant and sewerage system designed by A. E. McMahon Engineering Co., Menasha, Wis., and estimated to cost \$120,000, amount of Federal loan and grant. B. G. Dean is city clerk.

Electrical Connector & Mfg. Co., South Milwaukee, Wis., formerly Milwaukee Tool & Forge Co., affiliate of Line Material Co., same city, has plans for new machine and forge shop at Ninth and Menominee Avenues replacing plant destroyed by fire Aug. 6. Investment in building and equipment will be about \$40,000. William D. Kyle is president and general manager.

Milwaukee Press & Machine Co., 114 East Pittsburgh Avenue, Milwaukee, has established new division titled Fritz Bakery Equipment, Inc., to manufacture line of bread slicing machines and other specialized bakery equipment designed by Harry Fritz. Production is now under way.

Stoughton, Wis., electors at special referendum approved action of City Council to install Diesel engine standby unit in municipal power plant at cost of \$120,000. Federal loan and grant has been allotted. W. G. Kirchoffer, 22 North Carroll Street, Madison, Wis., is consulting engineer. E. U. Norman is city clerk.

◀ MICHIGAN DISTRICT ▶

Winslow - Baker - Meyerling Corp., Fisher Building, Detroit, operating Copeland Products, Inc., Mount Clemens, Mich., manufacturer of electric refrigerators, and other interests, has acquired Trupar Mfg. Co., Dayton, Ohio, manufacturer of household and commercial refrigerators, air-conditioning equipment, etc., and will continue operation at same location as unit of organization.

Pontiac Mfg. Co., 424 Ferry Street, Pontiac, Mich., has been organized by Hugh Chalmers, Jr., 103 South Alter Road, Detroit, and associates, to manufacture automobile parts and equipment.

Upjohn Co., Kalamazoo, Mich., manufacturer of chemical and drug products, plans new one-story steam power plant, 46 x 58 ft., with installation of boilers, automatic stokers, pumps and other mechanical equipment. Work will be carried out in conjunction with new six-story factory and three-story office building, entire project to cost over \$400,000 with equipment. Albert Kahn, Inc., New Center Building, Detroit, is architect.

◀ SOUTHWEST ▶

Denebeim Wholesale Liquor Co., 2113 Broadway, Kansas City, Mo., is acquiring local building and will remodel and equip for new brewing plant. Cost over \$50,000 with machinery. James A. Cowie, 114 West Tenth Street, is consulting engineer.

Board of Public Works, Hannibal, Mo., asks bids until Aug. 27 for equipment for municipal electric light and power plant, including 9375 kva. turbo-generator unit and accessories, condenser and accessories. Baumes-McDevitt Co., Railway Exchange Building, St. Louis, is consulting engineer.

Benjamin H. Ashe, Guymon, Okla., and associates plan new carbon black manufac-

uring plant on site about 3 miles from town, in Oklahoma Panhandle district, with installation of air compressors and engine units, pipe lines for natural gas service and other equipment. Cost over \$250,000 with machinery.

Common Council, Perry, Okla., is arranging bond issue of \$50,000 for new municipal electric light and power plant to cost about \$64,000, balance of fund to be secured through other financing. Diesel engine-generator unit will be installed. W. B. Rollins & Co., Railway Exchange Building, Kansas City, Mo., are consulting engineers.

Seitz Packing & Mfg. Co., Sixteenth and Commercial Streets, St. Joseph, Mo., meat packer, has engaged Menges-Mange, Inc., 1515 North Grand Avenue, St. Louis, architect, to prepare plans for one-story addition, including improvements in present plant. Cost about \$35,000 with equipment.

Ava Aircraft Corp., Houston, Tex., has been organized by Dewey Bonbrake and George R. Morgan, 2849 Albans Street, to manufacture aircraft equipment and parts.

Common Council, Marble Falls, Tex., plans installation of pumping machinery and accessories, pipe lines, etc., for municipal water works. Fund of \$43,000 has been arranged through Federal aid. H. R. F. Helland, First National Bank Building, San Antonio, Tex., is consulting engineer.

Common Council, Kenedy, Tex., has been authorized at special election to arrange bond issue of \$161,500 for new municipal electric light and power plant. Plans will be drawn at once.

◀ SOUTH CENTRAL ▶

Bernheim Distilling Co., Seventeenth and Breckenridge Streets, Louisville, has plans for new 10-story and basement addition, 150 x 155 ft., for storage and distribution, capacity about 50,000 bbl. Cost \$125,000 with equipment. Leslie V. Abbott, 8 Kenwood Village, Louisville, is architect.

Port Commission, Gulfport, Miss., asks bids until Aug. 30 for new pier and warehouse on waterfront, including ice-manufacturing and cold storage plant, pumping machinery, elevated steel tank, electrical equipment, etc. Fund of \$1,150,000 has been secured through Federal aid. Shourd & Bean, Gulfport, are architects and engineers.

City Council, Ashland City, Tenn., asks bids until Aug. 31 for municipal water system, including 100,000-gal. capacity elevated steel tank, pipe lines, fittings, etc.

Parolux Mfg. Co., 408 Empire Building, Knoxville, Tenn., manufacturer of chemical products, disinfectants, etc., is acquiring local building for new plant. Former factory will be removed from Detroit to this location, and capacity increased. R. M. Bates is head.

Rivet Cutting Gun Co., Covington, Ky., has been organized by Joseph De Salvo and John M. Crowe, Covington, to manufacture special cutting equipment and other mechanical devices.

Common Council, Logansport, La., plans installation of pumping machinery, pipe lines, etc., for municipal water system. A bond issue of \$35,000 has been approved. J. A. Holland, Shreveport, La., is consulting engineer.

Bradford Mills, Factory Street, Prattville, Ala., has awarded general contract to Batson-Cook Co., West Point, Ga., for one-story and basement addition to cotton mill, 55 x 90 ft. Cost \$30,000 with machinery. J. E. Sirrine & Co., Greenville, S. C., are architects and engineers.

◀ PACIFIC COAST ▶

Santa Cruz Portland Cement Co., Crocker Building, San Francisco, has let general contract to K. E. Parker Co., 135 South Park Street, for new branch storage and distribution plant at foot of Webster Street, Alameda, Cal. Cost about \$50,000 with equipment.

Bureau of Reclamation, Denver, Col., asks bids until Sept. 5 for new Pine View power dam and appurtenant works, Ogden River project, Utah, including steel piling, steel liner plates, steel sheeting, steel reinforcement bars, pipe drains, etc. (Specification 584).

Clarksburg Union High School District, Clarksburg, Cal., has asked bids on general contract for new one-story vocational shop at high school. Cost about \$25,000 with equipment. H. J. Devine, California State Life Building, Sacramento, Cal., is architect.